RITES Ltd.
(A Govt. of India Enterprise)
Gurgaon– 122001
Haryana, INDIA

Tender No: RITES/IT/ERP/296/2008

TENDER DOCUMENT

for

IMPLEMENTATION OF SAP ERP SYSTEM AND SUPPLY, INSTALLATION & COMMISSIONING OF IT INFRASRTUCTURE

at

RITES Ltd.

NOTICE INVITING TENDER

Tender No. RITES/IT/ERP/296/2008

GM (IT), RITES Ltd. invites sealed bids/offers (Technical & Financial) from reputed firms who fulfill Qualification requirements as an Implementation Partner to carry out broadly the following :

1. SAP ERP System Implementation & Support
2. To provide IT Infrastructure (Data Centre Setup, Servers, Hardware etc.)

The complete tender document can be purchased from GM/IT, IT Division, 3rd Floor, Central Wing, RITES Bhawan, Plot No. 1, Sector 29, Gurgaon – 122001, Ph-0124-2818309 at a cost of Rs. 5000/- or downloaded from RITES Web-Site www.rites.com. In case of downloading from website, the bidder must accompany a crossed Demand Draft/Bankers cheque for Rs. 5000/- (Rs. Five Thousand Only) as tender fee drawn on any Scheduled Commercial Bank in favour of RITES Ltd. payable at Gurgaon at par. The DD should be kept in an envelope containing Bid Security (EMD).

Amendments/Corrigendum, if any, would be hosted on the website only.

08/04/2011

GM/IT
RITES BHAWAN
Plot No. 1, Sector 29, Gurgaon
Haryana - 122001

BID DATA SHEET

Clause Reference	
CC 1(b)(i)	Name of Purchaser –**RITES Ltd.** **Contact person:** Mr. S K Bhardwaj JGM/IT, RITES Ltd RITES Bhawan, Plot No.1,Sector 29, Gurgaon 0124 - 2818309
ITB 5.1	Pre-bid Conference will be held on 26.04.2011 starting at 3 PM in the Conference Room, 6th Floor, RITES Bhawan, Plot No.1,Sector 29, Gurgaon
ITB 7	***The bid, all correspondence and documents related to the bid shall be in English.***
ITB 11.1	Amount of Bid Security Rs. 6,00,000/- **(Rupees Six lakhs)**
ITB 12	Bid validity: The bid shall be kept valid for a period of 120 (One hundred and Twenty) days from the due date of submission of bid.
ITB 13.1	Number of copies: 1 original +1 copy
ITB 13.2(b).	DO NOT OPEN BEFORE 15:00 Hours on 09.05.2011
ITB 14	Deadline for the submission of Bids is : Time: 15:00 Hours Date : 09.05.2011 In the manner specified in ITB 14 Venue/Address of correspondence: GM/IT, RITES Ltd 3rd Floor, RITES Bhawan Plot No.1,Sector 29, Gurgaon
ITB17.1,17.2 &17.3	Time, Date and Place of Opening of Bids: Time: 16:00 Hours Date: 09.05.2011 Place: 3rd Floor, RITES Bhawan, Plot No.1,Sector 29, Gurgaon ***Office of the General Manager (IT) in the above mentioned address. And in the manner as specified in the Request for Proposal (RFP).***
ITB 25	Amount of Performance Security (Performance Bank Guarantee): Ten percent of the Total Contract Price.

TABLE OF CONTENTS

SECTION I BACKGROUND NOTE 1

1. Organization 1
2. Current IT Systems in RITES 2
3. Proposed SAP ERP system in RITES Ltd. 2
5. Objectives of SAP Implementation 3
6. Way Forward 3

SECTION II - SCOPE OF WORK (SOW) 4

1. General Scope 4
2 Functional Scope 12
3 Geographic Scope of the SAP system 16
4 Number of Users 16
5 Implementation methodology and use of tools 16
6 Deliverables 16
7 Profile of proposed project team 21

SECTION III INSTRUCTIONS TO BIDDER 22

General 22

1 Qualification Requirements for the Bidders 22
2 Ethical Standard 22
3 Cost of Bidding 23

The Bidding Documents 23

4 Content of Bidding Documents 23
5 Clarification on Bidding Documents 23
6 Amendment of Bidding Documents 23

Preparation of Bids 23

7 Language of Bid 23
8 Documents Accompanying the Bid 23
9 Documents Establishing the Conformity 25
10 Bid Prices 26
11 Bid Security (EMD) 26
12 Period of Validity of Bid 27

Submission of Bids 27

13 Sealing and Marking of Bids 27
14 Deadline for Submission of Bids 28
15 Late Bids 28
16 Modification and Withdrawal of Bids 28

Bid Opening and Evaluation 28

17 Opening of Bids by Purchaser 28
18 Preliminary Examination of Bids 29
19 Evaluation and Comparison of Bids 29
20 Contacting the Purchaser 30
21 Award Criteria 31
22 Purchaser's Right to Accept or reject any or all Bids 31
23 Letter of Award 31
24 Signing of Contract 31
25 Performance Security (Security Deposit – SD) 31

SECTION IV CONDITIONS OF THE CONTRACT (CC) 32

Contract and Interpretation 32
1 Definitions 32
2 Contract Documents 34
3 Interpretation 34
4 a) Governing Law 35
5 Settlement of Disputes 35

Subject Matter of Contract 36
6 Time for Commencement and Go-Live Acceptance 36
7 Contractor's Responsibilities 36
8 Purchaser's Responsibilities 36

Payment 37
9 Contract Price 37
10 Terms of Payment 37
11 Performance Securities 40
12 Taxes and Duties 41

Industrial and Intellectual Property 41
13 Intellectual Property Rights 41
14 Confidential Information 41

Development, Implementation, Go-Live and Stabilization 42
15 Representatives 42
16 Project Plan 43
17 Design and Development 44

Guarantees and Liabilities 45
18 Time Guarantee & Liquidated Damages 45
19 Intellectual Property Rights Indemnity 45

Risk Distribution 45
20 Transfer of Ownership 45
21 Force Majeure 45

Change in Contract Elements 46
22 Changes to the "SAP" System 46
23 Prices for Services not covered in the Contract 47
24 Extension of Time 48
25 Termination 48
26 Assignment 50
27 Merger, Acquisition or Divestitures of the Contractor 50

Miscellaneous Clauses 50
28 Single currency conversion for bid evaluation 50
29 Insurance 50
30 Solvency of the Contractor 50

SECTION V 51

FORMS & ANNEXURES 51
FORM # 1 Profile of the Bidder 52
FORM # 2 Details of Projects Implemented 53

FORM # 3 Details of the Personnel to Be Deployed 54
FORM # 4 CV of the Team Members 55
FORM # 5 Deviations /Exclusions Schedule 56
FORM # 6 Financial Bid Forwarding Letter 57
FORM # 7 Price Schedule 59
FORM # 8 Contract Agreement 61
FORM # 9 Form of Bank Guarantees (Performance Security) 63
FORM # 10 Confirmation from SAP with regard to their role in SAP implementation at RITES Ltd 65
FORM # 11 Litigation History 66

ANNEXURE-I TECHNICAL EVALUATION MATRIX FOR THE SELECTION OF IMPLEMENTATION PARTNER (IP) 67

ANNEXURE-II SPECIFICATIONS FOR THE HARDWARE FOR DATA CENTRE 70

APPENDIX-I BUSINESS PROCESSES OF RITES 190

APPENDIX-II DETAILS OF LEGACY SYSTEMS 291

APPENDIX-III LIST OF OFFICE LOCATIONS OF RITES 294

APPENDIX - IV CHECKLIST FOR THE BIDDER'S PROPOSAL 295

APPENDIX - V SERVICE LEVEL AGREEMENT (SLA) 297

Section I BACKGROUND NOTE

1. Organization

RITES Ltd., a Government of India Enterprise was established in 1974, under the aegis of Indian Railways. RITES Ltd. is incorporated in India as a Public Limited Company under the Companies Act, 1956 and is governed by a Board of Directors which includes persons of eminence from various sectors of engineering and management.

RITES Ltd., an ISO 2008 company, is a multi-disciplinary consultancy organization in the fields of transport, infrastructure and related technologies. It provides a comprehensive array of services under a single roof and believes n transfer of technology to client organizations. In overseas projects, RITES Ltd. actively pursues and develops cooperative links with local consultants / firms, as means of maximum utilization of local resources and as an effective instrument of sharing its expertise. RITES Ltd. enjoys Mini Ratna Category-I status and is one of the first Public Sector Enterprises (PSEs) to have achieved ISO 2000 Certification for its entire range of services.

With work experience in more than sixty countries, RITES Ltd. is today established as a leading Consultancy Organisation in the international arena and recognized by multi-lateral funding agencies. RITES Ltd. now stands as one of the largest technical consulting firms in India having presence in a wide range of sectors and offering a variety of services under a single roof. RITES Ltd. clientele includes government agencies in India and abroad as well as top industrial groups in the country.

Sectors of Operation

- Airport Engineering
- Architecture & Planning
- Bridge & Tunnel Engineering
- Constriction Project Management
- Electrical Engineering
- Environmental Engineering/ Urban Engineering
- Expotech
- Financial Management
- Geotechnology
- Highway Engineering
- Industrial Engineering
- Information Technology
- Marine Engineering
- Marketing & Client Services
- Materials System Management
- Operations Management
- Ports & Water Ways
- Privatizations
- Quality Assurance
- Railways
- Railway Electrification
- Rolling Stock Design
- Ropeways

- Signal and Telecom
- Surveys
- Training
- Transport Planning and Economics
- Urban Planning
- Urban Transport

2. Current IT Systems in RITES

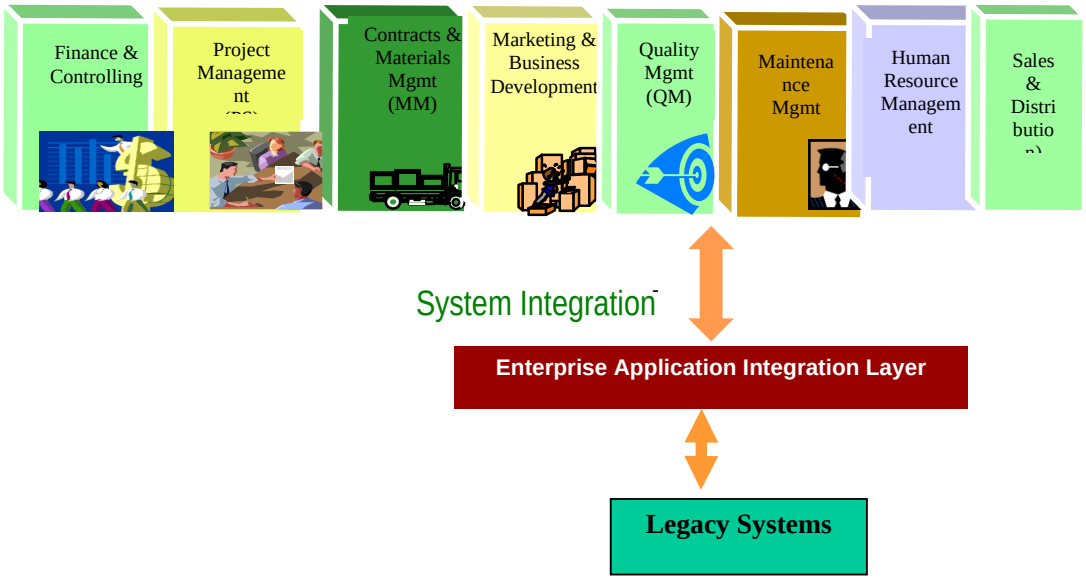
RITES Ltd. have a few fragmented stand-alone business application systems.

A list of the legacy systems working in different functions is given in Appendix II.

3. Proposed SAP ERP system in RITES Ltd.

SAP, being enterprise wide solution, offers an opportunity to integrate and optimize all functions of the enterprise. The business objectives can be effectively met if standard SAP system having best Industry practices is implemented. The IT strategy is based on implementation of SAP system in RITES Ltd, integrated with other functional systems, through this tender.

Proposed, "**SAP system"** at RITES Ltd. is indicated schematically in the following diagram.



4. Product and Integration

The SAP ERP system should include the following minimum functionality:

- Finance, Accounts & Controlling
- Projects Management
- Human Resource Management, Payroll and Employee Self Service (ESS)
- Purchasing, Contracts and Materials Management
- Marketing & Business Development
- Sales & Distribution
- Maintenance Management
- Quality Management

Typical functionalities required in the SAP product are provided in Appendix-I.

Enterprise Application Integration (EAI) layer will be used to integrate the SAP system with legacy systems being retained.

(If any legacy system cannot be integrated with EAI layer the same will be connected on a point-to-point basis with SAP system).

5. Objectives of SAP Implementation

Some of the objective expected to be achieved from the implementation of the SAP system at RITES Ltd. are:

- Enable streamlining and automation of business processes
- Seamless integration between business functions on real time basis
- Ensure one-time data entry ensuring data consistency and reliability.
- Eliminate errors by improved checks and validations.
- Maintain audit trail and drilldowns to eliminate data redundancy.
- Implementing SAP enabled Best business practices & processes
- MIS Reports on Real Time Basis.

6. Way Forward

RITES plans to Go-Live of the Pilot Phase (Phase I) on "**SAP system"** named hereafter as "SAP" with in a period of 9 months from the date of signing of the contract. The Roll out Phase (Phase II) is expected to be completed in another 6 months from the Date of Pilot Phase Go-Live. This tender aims to engage a SAP Implementation Partner for this purpose.

Section II - SCOPE OF WORK (SOW)

1. General Scope

RITES Ltd. expect the bidder to provide the following:

- SAP ERP System Implementation & Support (SAP implementation, Project Management, Training, Support, Help Desk etc.)
- IT infrastructure (Data Centre setup, Servers, Hardware, etc.)

The SAP ERP software will be procured directly by RITES Ltd.

The scope of the work includes, but is not limited to, detailing of functionalities listed in this tender document, understanding of RITES Ltd's Business Processes, design and development of implementation plan for both the Phase I and Phase II covering all the functions, configuration and realization of the SAP solution, development of interfaces/ integration with the legacy systems, testing, data migration/ porting, technical support, core team training, functional and user training, final preparation, switch-over to the SAP solution, post "Go-Live" support, setting up of competency centre, documentation, recommendation for technical infrastructure, project management and monitoring. The bidder will be required to ensure designing, configuring, testing and implementing all the functionalities/processes/modules that are required to be implemented. The scope of work also includes program management, change management, process improvement, solution assurance services and other services as detailed in this document. Bidder is required to critically review the purpose of implementation and shall ensure inclusion of all other essential services (not mentioned specifically) for achieving the objective within the time frame for successful implementation.

1.1 Scope of Work (SOW) for the IP

The general scope of the proposed system is as follows:

The IP shall be required to do the following:

A) SAP ERP System Implementation

I. Design and develop the Project Plan

The detailed project plan of the implementation is to be prepared at the commencement of the project. The implementation of SAP solution will require a strong program management activity integrating the core product implementation with software application. This ensures complete acceptability of the solution within the organization.

Program management services shall aim at constantly improving the business processes, leveraging technology solutions, incorporating best-of-breed industry practices to maximize opportunities for RITES Ltd.'s business operations and at the same time addressing growth and development of the employees.

II. Develop detailed scope for the functionalities to be implemented

The detailed scoping of the business processes to be implemented has to be finalized by IP in association with the project team members from RITES Ltd.

III. Deployment of IP Manpower

IP should ensure deployment of sufficient specialised and experienced man power throughout the project to complete the implementation & stabilisation of the System in time successfully.

IV. Detailed Design

IP has to design the relevant business processes with all details. This effort shall have the following important tasks:

- AS-IS process mapping to activity/ task level and current state analysis to identify areas of improvement and opportunities for standardization.
- Review the AS-IS processes and define the TO-BE processes that are based on business requirements, GAP Analysis and SAP enabled "best practices" and processes.
- Designing of the specific screens and data formats along with the process and method for entering the details.

V. Configuration

Based on the functionalities designed, IP shall be responsible for:

- Configuring the SAP system according to the processes
- Integration of the detailed design across modules
- Testing of configuration of Modules
- Identification of the fields that need to be captured for the Masters and mapping of the information with the legacy systems

The design proposed by IP, shall be realistic, simple, flexible enough to take care of future changes in the organizational structure and easy maintainability.

VI. Developments and Interface management with legacy systems

Developments shall be in the nature of enhancements to existing applications, additional applications, additional reports, and form changes.

Interfaces/ Integration will be to existing legacy systems or to additional standalone/ new applications. These interfaces may be interim (during the course of the project) or permanent (extending beyond the project) in nature. IP shall validate and confirm the need for any such developments/ interfaces that are required in order to meet the functionality of modules.

Following tasks are to be undertaken by IP with the assistance of RITES's Core Team:

- Prepare a fitment analysis to identify enhancements that are required because of business requirements and which cannot be met from standard SAP functionality or through workaround
- Identify the interfaces that will be required to be developed
- Study the structure of the legacy data systems w.r.t. SAP product with a view to identify enhancement, development, interface, and reporting requirements.
- Documenting the functional specifications for enhancement, development, interface and reporting requirements (e.g., Layout sets, daily status reports, reconciliation reports etc), based on inputs
- Prioritization of the development efforts and estimates for reporting / enhancement requirements.
- IP shall develop detailed technical design documents for all such development requirements including any data operation and security issues
- Assisting in data migration, Checking data quality and integrity
- Testing of developments/interfaces
- Document the procedures for implementing and maintaining the temporary/permanent interfaces, developments and enhancements.
- Data porting / uploading into the SAP system.

VII. Integration Management And Testing

Integration management and testing should be as per the standard practices. This shall include development of exhaustive test scenarios, carrying out the integration tests on these scenarios and necessary corrections based on test results and the feedback. IP shall be responsible for completing the integration tests with the desired quality and schedule.

RITES shall provide full support to IP in this connection. RITES and IP project team shall jointly envisage scenarios for testing and developing test scripts. RITES will also make available live data for the purposes of testing wherever required. RITES, IP and Quality Review group shall extensively participate in the module and integration testing. IP shall be responsible for the documentation of integration process & test results. The Quality Review Group proposed to be formed at RITES shall comprise representatives of RITES, SAP, Implementation Partner and the Consultant of RITES.

The data conversion testing shall also be done in similar manner to ensure that, after the loading of final data, the system remains stable.

VIII. Data Migration

All specifications that are needed to populate the data into the new ERP system need to be defined.

IP's responsibility for Data Migration

This shall include the following tasks:

- Identification & development of the data upload/download programs
- Providing data migration tools and templates to RITES
- Populate and migrate all the legacy/ raw/new data element to the SAP system
- Training and facilitating the RITES core team
- Assistance in Checking data quality and Integrity
- Integration testing of the configured system using the populated master and transaction data
- Assist RITES team in Master Data management

The following data need to be migrated:

- All open transactions and all transactions from the start of financial year of Go-Live.
- Standing or master data such as vendors/suppliers, customers, all employees, material, work breakdown structures, equipment, work specification, cost data, etc.
- Transactional data for all live projects of RITES. The live project data to be populated based on the agreed TO-BE process requirement.
- All the related Master Data and associated drawings, test results etc. as applicable

IP's responsibility shall be to ensure that data migration is complete in all aspects, within time so that the requirements of the implementation are fulfilled.

RITES Ltd.'s responsibility for Data Migration

RITES Ltd. shall cleanse, rationalize and validate the data with Bidders assistance.

IX. Technical Support

IP is required to undertake the following:

a) Formulation of all policies and procedures related to Basis technology, System Administration, Data Base Management, applications, archives, network management & security, back up etc.

b) Prepare requisite system landscape and procedures for smoothly implementing SAP. This shall also take into consideration the phased pilots and rollouts.

c) IP shall assist the RITES team to perform all authorization-related activities (activity group, authorizations, profiles, etc) till the SAP system stabilizes.

d) Assist RITES to manage the legacy data interfaces, print spools, batch Jobs, printer configuration etc.

e) Prepare a detailed System administration manual, Data administration manual, operational manual, User manual which shall be used by RITES employees to run SAP enabled production environment. This shall also include how the various parameters shall be monitored/ tuned in a live system.

f) Finalize the archival policies for all the functional areas. All necessary configurations shall be done and tested.

g) Prepare requisite system configuration for disaster recovery management and Fail Over system plan.

h) Round the clock support for trouble shooting in functional and technical area

X. Training

IP shall conduct a training need assessment of RITES Ltd.'s SAP core team members as well as end-users as a component of the process improvement and change management process. Training needs should be continuously refined and frequently reconfirmed with the end-user community & the core team as the project progresses.

Training tools and Training materials:

Use of recommended SAP training tools / software(s) for providing various training is essential. Adequate training material which includes training manuals, quick reference cards etc should be provided during the training sessions. The recommended training material should be in paper & electronic media with courses on SAP fundamentals, business process overview, job activity training, and delivery options being on-line, instructor led class rooms, etc.

Core Team Training

This is the training for the SAP core team of RITES Ltd. for SAP implementation. This core team of RITES Ltd. will comprise of members from all the business functions and IT. This training should enable the SAP core team of RITES Ltd. for setting up of SAP Competency Centre and to involve in implementation, building and managing SAP related skills and maintain the SAP system in RITES Ltd.

The training should be given to approximately 40 personnel of RITES Ltd. by IP themselves, at the cost of IP at RITES Ltd. The quality of the training should be equivalent to SAP certification training based on standard SAP certification training material.

End User Training

All the end users need to be trained for the smooth functioning on SAP System. The IP shall submit a detailed Training Plan for all the end users.

XI. Final Preparation and Go-Live

IP is required to undertake the following at the purchasers premise:

- Review readiness for cut over
- Manning the central help desk for any queries
- Resolve Technical & functionality related issues for SAP
- Define the requirements towards the phasing out of the legacy systems
- Review the usage and performance of the SAP system till it stabilizes
- Maintaining the interface between legacy system and SAP during transition
- Interfacing with the proposed UCS & existing Legacy Systems to be retained.
- Documentation of the issues/problems that come up and solutions thereof.
- Final configuration/ integration, volume and stress testing
- Data migration
- Switch over to production environment.

XII. Post Go Live Support

(a) Stabilization support

IP shall be responsible for Project implementation and correct & satisfactory functioning of the SAP system. IP shall provide post – implementation support to the purchaser to ensure the efficient day-to-day functioning of the SAP system for a period of three months from the date of Go-Live at all the locations of RITES Ltd. Atleast two persons from each function and two persons from each technical area like ABAP, Basis etc. should be there on site during stabilization period. In addition, IP shall extend their support during the 1st quarterly, half yearly, nine monthly and annual closing (for 10-15 days for each).

(b) Extended support

In addition to (a) above, IP is required to provide extended support for 1 year from the end of stabilization support period at a price to be quoted in the financial bid. During this period, IP shall ensure trouble free running of the total system.

Additionally, the IP is required to provide handholding support for another 1 year at the discretion of the purchaser with the same price and terms & conditions of the contract as that of extended support.

For smooth running of the system & day-to-day functioning it is of paramount importance that adequate transfer of knowledge to the core team members of RITES takes place. Towards this, the IP should mentor a group of core team members who will be responsible for doing any configuration change independently.

IP needs to take the responsibility of creating post-go-live support strategy. The objective of this exercise is to ensure that RITES Ltd. builds in-house competencies to maintain the SAP solution in the long term without dependency on external consultants.

XIII. Documentation

IP shall ensure preparation of complete documentation of all configuration settings, other activities, steps / stages involved in the implementation with the support of the Core team. IP in close coordination with RITES Ltd. core team shall prepare the business process document, end-user manuals and training documents in the jointly agreed templates. Three (3) sets of hard copies along with three (3) sets of softcopies in CD/DVD of each of the finalised documents shall be submitted to RITES Ltd.

XIV. Technical Architecture

IP shall validate RITES Ltd's existing technical infrastructure and recommend an appropriate solution to meet RITES Ltd's business requirements in the implementation of the SAP system. IP shall also monitor the archiving strategy, control and security aspects during implementation at RITES Ltd.

IP will then recommend the IT architecture design including hardware, and operating system for the implementation keeping in view the geographical spread & complexity of the implementation, communication infrastructure available in the country & at RITES Ltd. and Data Archival & Storage requirements. The recommended architecture shall also provide for scalability, disaster recovery, test and production environments. IP shall assist in providing detailed specifications for the sizing of hardware to be procured by RITES Ltd. IP shall also validate the hardware configuration to be procured by RITES Ltd.

XV. Sign Off And Closure

RITES Ltd. recognizes the importance of an expeditious sign off and closure of agreed deliverables and RITES Ltd. Team will expedite the process of sign off and closure. However, IP shall facilitate such acceptance/sign off from the Management/Process owners for all the deliverables mentioned above by way of preparing / producing such documentation / review reports / test results etc. as may be necessary for RITES Ltd. to ascertain that the prerequisites to subject sign off and closure have been met completely in accordance of the Contract Document.

XVI. Solution Assurance by Quality Review Group

The SAP implementation at RITES Ltd. is to be monitored by the Quality Review Group for ensuring smooth and timely implementation as per the requirement of the purchaser. IP shall provide details of the Quality Assurance Plan envisaged for the implementation of SAP system in the project plan. RITES Ltd. requires that all the deliverables forming part of the whole implementation process including broadly the Implementation Strategy, Business Analysis, Readiness Assessment and Go Live Review etc. will be subjected to stage- wise Quality Audit by Quality Review Group. The Quality Review Group shall comprise representatives of RITES Ltd, Consultants of RITES Ltd, ERP OEM (SAP) and the Implementation Partner**.**

The Quality Review Group shall be responsible for:

- Communicating the project status & risk to top management
- Establish Project Standards, Methodologies & Tools
- Participate in Steering Committee meetings
- Drive Quality Review process
- Prepare Quality Review Strategy & Plan
- Review Business Blueprinting prepared by Bidder
- Review SAP system Go live readiness
- Review SAP system stabilization.

B) Supply of Hardware

Data Centre: IP shall construct the Data Centre for ERP, size, supply, install, configure and maintain the server hardware required for the SAP ERP system, including supply of necessary systems software such as Server Operating System, anti virus etc., provide perpetual software licenses, user and administration manuals, software upgrades, maintenance, patches and warranties and provide on-site support for the data centre, for the entire period of the contract The IP shall assist RITES Ltd in setting up the data centre.

1.2 Organization Change Management

The purpose of Organization Change Management is to ensure that RITES Ltd. achieves the expected results from its investment in SAP technology in a short span of time. As part of this service, IP will work closely with RITES Ltd. core team in introducing the change-processes, stressing the importance of organizational alignment, and introducing the necessary tools and techniques needed to address issues in the Organization.

1.3 Process Improvement

Process Improvement will be done to enable RITES Ltd. to adopt some of the best practices embedded in the SAP system systems. The areas that can bring maximum benefits will be identified by IP in close coordination with RITES Ltd. process owners. The consulting IP team needs to work closely with the user team to translate this into a set of processes that can be implemented in SAP. In order to do this, IP will also bring in knowledge of the best practices adopted by other world-class organization to the RITES Ltd. implementation.

IP shall associate in identifying KPI's for RITES Ltd. and share benchmark data with RITES Ltd. team so that their relevance in terms of best practices in the industry can also be ascertained. This in turn will help the implementation team to set up these KPIs in the system. The KPI's relevant to RITES Ltd. will thus be identified and made to report through BW of the SAP system.

RITES Ltd. envisages that the proposed process improvement and process re-engineering is SAP-enabled. This will enable early completion of the implementation and will also avoid any major re-work. Accordingly process improvement exercise will be an integral part of implementation and the project plan for the same will be dovetailed as part of the overall SAP implementation plan.

1.4 KPI Measurement & Monitoring

The Key Performance Indicators (KPIs) shall enable RITES Ltd. to measure, analyze and improve the business processes and performance within the enterprise. KPIs shall enable comparing performance data from RITES Ltd. with industry benchmarks, which in turn shall help in defining new goals for enhancing performances. This substructure shall be created for enabling RITES Ltd. to optimize the processes by combining key data from KPIs with information on how the business processes affect these KPIs.

The measurement of KPI's will be done using the standard reports in various modules and the SAP Business Information Warehouse (SAP BW) system. The scope of work shall also include configuring the SAP BW system to meet the reporting and measurement parameters specific to RITES's business requirements.

1.5 Quality Review and Audit by the ERP OEM (SAP)

The SAP implementation at RITES is to be audited / reviewed on continuous basis by the ERP OEM (SAP) for ensuring proper, smooth and timely implementation as per the

requirement of RITES. The cost involved in the above is to be borne by the Bidder and included in their Price Bid. RITES shall directly pay the ERP OEM (SAP) against their invoice to be routed through the Bidder's Project Manager and such payment to the ERP OEM (SAP) will be deemed to be made to the Bidder and limited to the total payment due to the Bidder up to the completed milestone.

The ERP OEM (SAP) will depute one Senior Manager for atleast 5 days each during Blueprint & Go-Live phase on mutually agreed days at RITES site for ensuring smooth, proper and timely implementation of the SAP system at RITES. Also representatives from the ERP OEM (SAP) will be members of the Steering Committee to be formed at RITES for the constant review and monitoring of the SAP implementation at RITES. The feedback provided by the ERP OEM (SAP) has to be incorporated by the Bidder at no additional cost.

The envisaged responsibilities of the ERP OEM (SAP) for the SAP implementation project at RITES are as follows:

Monitor and Review Quality of Project's Progress

i) Review Business Blueprinting prepared by the Bidder
ii) Prepare Quality Review Reports in the following areas:
    a) Solution Review
    b) Technology Review
    c) Development Review
iii) Suggest Review recommendations and Update Steering Committee
iv) Periodic Review of Project Status, Plans and Progress
v) Review Go-Live parameters/ readiness for the SAP implementation
vi) Participate in Steering Committee meetings and select project meetings
vii) Review the SAP Stabilization at all the locations of RITES
viii) Establish effective issue reporting and resolution structure

The ERP OEM (SAP) shall perform Audit Service as per the scope of work specified in the tender document and submit Audit report/Audit observations on the SAP implementation to the Steering Committee from time to time including two audit reports/observations to be submitted, one after the Business Blue Print and the other before the Pilot Go-Live of the SAP system.

(The Bidders will have to submit a confirmation with regard to above, from SAP on their Letter head signed by their Authorized signatory, as per format given at FORM #10 and enclosed with the Technical Bid Part – I).

1.6 Knowledge Transfer & Training

RITES believes that it needs to build in-house skills in SAP implementation that will enable RITES to reduce the dependency on external skills. The implementation approach followed by IP has to be such that it ensures that there is significant knowledge transfer from consulting team to the RITES Core Team during the course of implementation. This coupled with the emphasis on the product and implementation training offered to user teams before starting the project ensures that the required platform for knowledge transfer is established. IP shall impart user's training.

RITES understand that for a project of this magnitude, appropriate & well-designed training for the core implementation team is a critical success factor. A well-designed training strategy is vital for development of competency that would enable RITES's core project team to steer the SAP implementation program through out the organization. IP shall therefore prepare a plan for suitable training needs of RITES's project core team members that would help them understand the SAP system in detail and subsequently undertake the SAP implementation.

1.7 Project Management Guidelines

a) The project will be governed by a Steering Committee that consists of members appointed by RITES, member(s) of IP and Quality Review group. RITES will approve the constitution of Steering Committee at the commencement of the project.

b) IP shall be responsible for "go-live" as per the agreed schedule and output from the deliverables in each Phase.

c) RITES shall appoint a Project Management team (PMT) who shall co-manage the project together with the Project Manager appointed by IP and drive the project to successful completion.

d) IP, in coordination with RITES's PMT, shall execute the detailed design/configuration/testing and all other aspects of implementation.

e) Deployment of resources by IP in the project is subject to acceptance of the quality of such resources by RITES. For any replacement / addition of resources, IP shall give four weeks advance notice to RITES.

Further, during the course of the project, if RITES finds any resource unsuitable, they shall have the right to de-list the resource from the project after due deliberations with IP immediately and providing one month time for appropriate replacements.

f) All the deliverables of IP will be subjected to quality review under Solution Assurance by Quality Review group.

g) In all the activities of implementation, IP's Project Team shall bring in expert Inputs and guide the project. The RITES's Project Team shall actively participate along with IP in carrying out required activities.

2 Functional Scope

2.1 SAP ERP system will broadly cover the following prime functions of RITES Ltd.

(Typical functionalities required in the SAP product are given in Appendix-I; below mentioned list is Indicative & not exhaustive)

- Finance, Accounting and Controlling
  - General Ledger
  - Accounts Receivable
  - Accounts Payable
  - Payments and Reconciliation
  - Costing
  - Budgeting
  - Assets accounting
  - Assets Leasing
  - Taxation, duties and levies
  - E-payment and E-receipts
  - Banking & Treasury
  - Risk Management
  - Investments & FD
  - Fund Management
  - Contract Accounting
  - Export/ Import Management
  - Audit Trail
  - PF Administration
  - MIS

- Project Management for Consultancy projects & Other than consultancy projects like – Export, Lease, Inspection, Operation and management, Project Management, Privatization and Concession, Training and capacity building, Procurement services – Material System Management, EPC – Turnkey, Quality Assurance Services
    - Pre-Project planning involving project identification, Project manpower Utilisation feasibility studies and project appraisal
    - Project support activities comprising surveys, environmental and social impact assessment, geo-technical and other investigations
    - Project preparation activities of detailed engineering, design, tender documentation, bid evaluation, Vendor selection, construction management (Deposit Works and EPC- Procurement of material, selection of construction agency, client's fund management, contractor's bills, measurement books etc)
    - Project implementation/ Payment to contractors, management covering contract administration, field engineering and construction supervision, procurement services, product certification, quality assurance.
    - Design and development of rolling stock
    - Operation and Maintenance **- C**ommissioning, operation, maintenance, rehabilitation of rolling stock and workshop management.
    - Quality assurance and management, third party inspection, In-house Laboratory Testing, technical audit Certification Assistance for management Systems in ISO 9001, ISO 14001, ISO 22000, OHSAS 18001 etc including relevant training.
    - Multimodal Transport studies.
    - Materials supply management- Procurement and Logistics Management consultancy services for the projects funded by bilateral and multilateral funding (World Bank, ADB etc.) agencies as well as those funded by local Government
    - Conduct structured training and development programs for personnel of all categories and disciplines.
    - Financial, business plan, advisory services (P&C)
    - Design, development and implementation of information system
    - Export and Lease -Supply, leasing, rehabilitation, commissioning of locomotives and rolling stock, spares and subassemblies and allied services. Sizing, Selection, Supply, Commissioning, rehabilitation and leasing of Railway Rolling Stock including Inventory, Billing etc.
    - Economic and financial evaluation
    - Other Areas like Domain Training, Management Consultancy, etc.

- Human Resource Management, Payroll and Employee Self Service (ESS)
    - Employee Database
    - Recruitment
    - Training and Development
    - Employee separation
    - Manpower planning
    - Promotions (Performance Appraisals)
    - DAR (Disciplinary Action Rules) & Vigilance

- Medical facilities
- Grievance Redressal
- Employee Transfer & Postings
- Employee Leave Accounting
- Staff Advances
- Time Management (Attendance system)
- Misc. staff bill processing
- Self/ Company leasing
- Retirement/ Resignation/ Termination and Death Cases
- Payroll

- Purchasing, Contracts and Materials Management
  - Indenting
  - Sourcing
  - Tendering
  - Placement of Order (P.O.)
  - Post Order Placement Activities
  - Inspection
  - Inventory Management
  - Consignment Management
  - Procurement of services

- Marketing and Business Development functions
  - Business Development activities
  - Client information management
  - Tendering

- Sales and Distribution
  - Sales Management
  - Trading functions
  - Distribution of Loco's etc to overseas clients

- Maintenance Management
  - Maintenance planning & scheduling
  - Maintenance work order processing- (from notification to completion)
  - Spare parts management
  - Outsourcing jobs through contractual resources
  - Maintenance document management like drawings, standard maintenance practices, Safety manuals, maintenance manuals, reports
  - Maintenance history & analysis
  - Maintenance budgeting & costing

- Quality Inspection Management
  - Quality inspection and monitoring

- Corporate Services and Administration
  - Company Secretary - Correspondence with Ministry, Meetings, Parliament queries, VIP references & other works of co-ordination section
  - Library
  - Hindi Cell
  - Legal Cell
  - Marketing and Client Services
  - Insurance
  - Air ticket bookings
  - Stationery
  - AMC, Maintenance of contracts, Facility management and maintenance of RITES Building, Guest House, Flats
  - Dispatch & courier
  - Welfare and canteen
- Others
  - IT Centre – AMC Services for IT Hardware Maintenance, Procurement, Internet services
  - ISO Division – Compliance of ISO standard in RITES
  - Internal Email System
  - Management Information System
  - File Tracking System

2.2 Other Functions

In order to support the prime functions, the SAP should also cover the following:

- Dash Board functionality (including Business Analytics and BI tools)
- Document Management
- Workflow Management

RITES Ltd have envisaged prioritizing the overall functional scope into two main phases:

Phase I - Pilot Phase

RITES Ltd. wishes to implement all the functions as mentioned above to the entire organization in the Pilot Phase comprising of the Corporate Office at two locations in Gurgaon, One Regional Office at Delhi and One Office at Kolkata. This phase must attain go-live latest by the end of 9th month from start.

Phase II - Roll - out Phase

Roll-Out sites shall address the Go-Live of the remaining locations/ offices/ sites of RITES Ltd. The roll-out of all the remaining locations should be completed by 6 months. The price for the Roll-Out Phase as quoted in this tender shall remain valid till 3 years from the date of submission of this bid. Apart from this, IP shall also provide 3 months of stabilization support after the Go-Live at all the locations of RITES.

Legacy Systems to be integrated with SAP system

Brief description of all existing legacy systems is given in Appendix II. All the systems will be integrated with SAP system using EAI layer. Integration will be done using standard

connectors as appropriate to the SAP system and the legacy systems. However, some of the legacy systems may have to be connected to SAP system on point-to-point basis where they are not compatible with EAI software. During implementation, number of touch points of each system may increase or decrease. Also if all the functionalities of an existing legacy system are covered in SAP, then that system will be shifted to SAP.

3 Geographic Scope of the SAP system

The Geographic scope of the implementation of the SAP system shall be RITES Ltd. establishment at Gurgaon Office & all other offices/locations of RITES Ltd.

A list of the present location consisting of the Corporate Office, Gurgaon alongwith other Regional Offices is provided in Appendix III. The geographical scope for implementation can be extended if any new office/site comes up in RITES Ltd. during the implementation phase. Also, provision is required to be kept under the SAP Implementation project to include new project site envisaged in the future.

4 Number of Users

Estimated number of users of the SAP system has been initially assessed at 200 named users which may go upto 500 named users. Apart from that 2,500 ESS users and 2,500 payroll users are required for RITES. Decision regarding the distribution of SAP licenses to various locations within RITES Ltd. will be at discretion of the purchaser.

5 Implementation methodology and use of tools

During the SAP Implementation Process, the methodology used should be a proven and repeatable process and should be based on ASAP methodology. Implementation Partners should have extensive previous experience in use of ASAP methodology tools like SAP Solution Manager and make extensive use of them for accelerated implementation and minimise risks.

6 Deliverables

IP shall be required to follow milestone based deliverables for the SAP Implementation process. The methodology, detailed project activities, deliverables and responsibilities, which are to be followed during implementation are given as below.

Sl. N0	**SCOPE**	**DELIVERABLE**
1.0	**PROJECT PREPARATION**	
1.1	The IP shall submit detailed Project Plan and get it finalized in accordance with the clause no. 16 of the Conditions of Contract	Agreed And Finalized Project Plan
1.2	The IP shall study the Scope of the work, in particular the Functionality Requirement Specifications, Technical Requirements and give their observations/understanding of the total work, resource commitment and elaborating broadly on the development proposed to be taken up through customisation/third party tool/bespoke development	Inception Report

Sl. N0	SCOPE	DELIVERABLE
1.3	SAP training for the core team of RITES Ltd.	Core Team Training Completion Report
1.4	Project Kick Off and Project Preparation Phase closure	Team Mobilization & Project Preparation Phase Sign Off
2.0	**BUSINESS BLUEPRINT**	
2.1	The IP shall study the existing functionalities of all the business processes & submit the document detailing at least the functionalities, problem areas & expectations of the purchaser	"AS-IS" process Mapping And Analysis Report
2.2	After analysing performance of the "AS-IS" processes, the bidder shall prepare a comparative analysis of each of the functionality with the best practices of SAP system so as to identify the desirable processes. He will then prepare the "TO-BE" Process document along with Gap Analysis Report, which will include his specific recommendations for RITES Ltd.'s adoption of new process	"TO-BE" Process Mapping Document & Gap Analysis Report
2.3	Freezing of customisation requirement after the purchaser finalizes its decision to adopt some or all of the best practices of SAP	Customization Requirement Report
2.4	Prepare Data Migration strategy and Data Migration templates. Also identify the requirements for Master Data	Data Migration Strategy & Templates, Master Data Structures
2.5	**Interfaces**	
2.5.1	Provide necessary interface specifications to integrate the Legacy Systems with SAP system.	Legacy System Interface specification Report
2.6	**Installation of development environment**	
2.6.1	Assist the purchaser in accepting installation of the hardware servers etc. at the premises of the purchaser.	
2.6.2	Prepare the additional networking requirements (if required) for the SAP system keeping in mind Networking and Communication infrastructure already available with the purchaser.	Network And Communication Specification
2.7	**Change Management**	

Sl. N0	SCOPE	DELIVERABLE
2.7.1	Prepare change management strategy and identify the Change Management issues - Processes/Procedure - Roles/Responsibility Assist RITES Ltd. in it's Change Management initiatives.	Change Management Requirement Report & strategy
2.8	Identify training requirement for various levels of End users of the purchaser (in consultation with purchaser).	Training Requirement Report for the End users
2.9	Design training modules, prepare and supply study materials including audio-visual contents of the training (In consultation with purchaser).	Training Curriculum for the End users
2.10	Business Blueprint Phase closure	Business Blueprint Phase Sign Off
3.0	**REALIZATION**	
3.1	The IP shall identify, design and develop those components of the functionalities that are not covered within the standard SAP product.	Bespoke Development Plan
3.2	IP shall provide the design of the bespoke component together with its schedule for development. The development of the bespoke component will however be under taken only after its approval by the purchaser.	Bespoke Design Documents
3.3	IP shall provide the source code together with complete documentation for such bespoke component of the SAP solution.	Bespoke Development Source code Documentation
3.4	**Interfaces**	
3.4.1	IP shall integrate the specified legacy systems with SAP system using standard EAI layer software and connectors as per specifications**.**	Legacy Systems Integration Report
3.5	**End User Training**	
3.5.1	Train all the end users of the purchaser in the SAP implementation. The end user training should enable the operational user to carry out his/her functionality in respective area.	Training schedule & Training Completion Report for the End users
3.6	**Authorisation security and access control**	

Sl. N0	SCOPE	DELIVERABLE
3.6.1	IP shall assist RITES in formulating appropriate security/ authorization, control policy to prevent unauthorized access to programs, data, screens and outputs.	Authorization, Security And Access Control Specification
3.6.2	Shall build the prescribed access right & control mechanism into the SAP system.	Demonstration Report
3.7	**Integration Testing**	
3.7.1	IP shall plan and carry out comprehensive tests of all the modules and carry out corrections based on test results and feed back. Quality Review group shall be involved in testing of each module and sub module and requisite interfaces. IP shall simulate full load and stress test.	Unit test report, Integration test report, Full Load & Stress Test Report, User Acceptance Test Report and Sign Off
3.8	Realization Phase closure	Realization Phase Sign Off
4.0	**FINAL PREPARATION**	
4.1	**Audit and Quality Control**	
4.1.1	IP shall submit the standard parameters for auditing and quality control of the system to be provided by SAP and demonstrate their effectiveness to the Quality review group.	Quality Audit acceptance
4.2	**Data Migration**	
4.2.1	IP shall extract, transform & load/ migrate the data from the legacy systems and other electronic data of the required period as specified by RITES to the SAP system	Data Migration Completion report
4.2.2	Extract the data from the legacy systems as per the Cut Over strategy into the format as required by the SAP system	Functional Specifications for Upload programs
4.3	If, for reasons entirely attributable to IP, the SAP based system does not conform to the Scope of the Work or does not conform to all other aspects of the Contract, the bidder shall at its cost and expense make such changes, modifications, and/or additions to the system as may be necessary to conform to the Scope of Work and meet all functional and performance standards.	Action taken Report
4.4	Assist the purchaser for setting up SAP competency centre	Technical support

Sl. N0	SCOPE	DELIVERABLE
4.5	Prepare System Manual in adequate detail for use in the Central Computer Centre to enable trouble shooting by purchaser's software personnel. The bidder will also prepare detailed User Manual for each module to enable the field level user to use system effectively. The User Manual must be exhaustive and shall contain detailed, step by step instruction for smooth access to, operations in and exit from the system.	System, User and other Manuals
4.6	Set up a Help Desk facility at purchaser's premises	Help desk setup
4.7	Pilot Go Live readiness and Final Preparation Phase closure	Final Preparation Phase Sign Off
5.0	**PILOT GO-LIVE AND POST GO LIVE SUPPORT**	
5.1	Commencement of commercial transaction on the production system for the Pilot sites (Pilot Go-Live)	Pilot Go Live of the SAP system
5.2	Customisation Training to Core Team	Customisation Training Sign Off
6.0	**ROLL-OUT OF THE SAP SYSTEM AND EXTENDED SUPPORT**	
6.1	Roll-out of the SAP system to all the remaining locations of RITES Ltd. within 6 months	Roll-out of the SAP system
6.2	**Post Go-live Support:** For attending to the problems occurring on day to day basis, the bidder shall provide stabilization support (Post Go-live Support) on-site for a period of 3 months from the date of Go-live at all the remaining locations of RITES. During stabilisation (Post Go-live Support) period, the implementation team shall be available at RITES to sort out day-to-day operational problems that may arise.	Action taken report
6.3	**Extended Support**: IP shall continue to provide Extended support on site for an additional period of 1 year after roll-out at all the locations of RITES.	Action taken report
6.4	In addition IP shall extend their support during quarterly, half yearly, 9 monthly & annual closing (for 07 days in each case).	Action taken report
6.5	Closure of the Issue List and Project Closure	Roll-Out Phase Sign Off and Project Closure
7.0	**DISASTER RECOVERY AND BACK-UP POLICY**	

Sl. N0	SCOPE	DELIVERABLE
7.1	IP shall formulate an effective Back-Up strategy and Disaster Recovery Plan and advice on Business Continuity Requirements.	Back Up Strategy And Disaster Recovery Plan
7.2	IP shall formulate an effective plan for failover system to ensure business continuity requirement.	Fail over system plan
7.3	IP shall test the effectiveness of the Back Up Strategy and the Disaster Recovery Plan.	Test report
7.4	IP shall demonstrate continuity of business processes & activities from the DR site.	Demonstration report

All the deliverables mentioned above should be submitted at least in five hard copies & one soft copy in CD-Rom.

7 Profile of proposed project team

IP has to deploy a specialised and trained team for the successful and timely completion of the Project at RITES Ltd. It is therefore mandatory that the key personnel in the team have the following minimum qualification and work experience.

a) One Project Manager
   - Atleast 2 SAP End-to-end implementation experience, out of which, atleast 1 SAP project should be as a Project Manager.

b) Atleast two Functional Consultants for each module
   - Atleast 1 SAP End-to-end implementation experience.

All the manpower proposed for the project team must be a B.E./ B. Tech/ MBA/ CA or equivalent. The manpower and the project team proposed for RITES Ltd. will be verified by the Evaluation Committee of RITES Ltd. at the presentation to be given by IP.

Section III INSTRUCTIONS TO BIDDER

General

1 Qualification Requirements for the Bidders

This bidding process is open to SAP certified Implementation Partners (IP) with successful implementation of SAP system across the world having:

(i) An average annual turnover of minimum Rs. 200 Crores from their Software Service Business in the last 3 financial years in India (Copy of Audited Balance Sheets for last 3 financial years to be provided) and

(ii) Should have experience of atleast one SAP ERP project* as a prime Implementation Partner/ Program Management Consultant in PSU / Govt. Sector in India (Project completion certificate from Client & Other Documentary evidences) and

(iii) Should have SEI CMM Level 3 or higher level certification. In case, the certificate for SEI CMM Level 3 or higher level certification expired, then the Assessment certificate for further regularization or upgradation of SEI CMM Level 3 or it's higher level need to be submitted (Copy of SEI CMM Level 3 or higher level certification or Assessment certificate for further regularization or upgradation need to be provided) and

(iv) The IP must have atleast 200 SAP Functional Consultants as on 31st Dec, 2010 on the roll's of the Company in India (Certificate by the CEO/ Head of the Company/ External Auditor need to be provided).

** For a project, to qualify as a SAP ERP project, please refer to the definition of SAP ERP project at Annexure I.*

Subsequent sub letting / offloading of full or part of the work and supply of 3rd party software, unless otherwise specified in the contract or with due permission by the purchaser, will not be allowed. No bidding through Consortium will be allowed.

The bidders must familiarize themselves with local conditions and take these into account while preparing their proposals. To facilitate the bidders in making the proposal, the client can be contacted at the address given in the Bid Data Sheet.

2 Ethical Standard

Bidders are expected to observe the highest standard of ethics during the procurement and execution of this Contract. In pursuit of this policy, the Purchaser will reject a proposal for award if it determines that the Bidder being considered for award has engaged in corrupt or fraudulent practices in competing for the Contract.

For the purposes of this provision, the terms set forth below are defined as follows:

(i) "*Corrupt practice*" means the offering, giving, receiving, or soliciting of any thing of value to influence the action in the procurement process or in Contract execution; and

(ii) "*fraudulent practice*" means a misrepresentation of facts in order to influence a procurement process including collusive practices designed to establish bid prices at artificial, non-competitive levels to deprive the Purchaser of the benefits of competition

3 Cost of Bidding

The Bidder shall bear all costs associated with the preparation and submission of its bid and the Purchaser will in no case be responsible or liable for those costs.

The Bidding Documents

4 Content of Bidding Documents

4.1 The Bid Documents shall consist of the documents listed below and any addenda as may be issued there to

- Section I Background Note
- Section II Scope of the Work (SOW)
- Section III Instructions to Bidders (ITB)
- Section IV Conditions of Contract (CC)
- Section V Forms and Annexures

4.2 Bidders are expected to examine all instructions, forms, terms, specifications, and other information in the bidding documents. Failure to furnish all information as required or to submit a bid not substantially responsive to the bidding documents may result in rejection of the bid.

5 **Clarification on Bidding Documents**

5.1 A pre-bid meeting shall be organized as per details provided in the Bid Data Sheet to provide clarifications sought by the bidders. Any Addendum/Amendments to the bidding document will be uploaded in the purchaser's website.

5.2 A prospective Bidder may also request for any clarification of the Bidding Documents by notifying the Purchaser in writing within ten (10) days of the issue of the bid document. The Purchaser will respond to such request that it receives no later than the Pre-Bid meeting prescribed by the Purchaser. Copies of the query and the Purchaser's response will be uploaded on the purchaser's website.

6 **Amendment of Bidding Documents**

6.1 The Purchaser may at its sole discretion amend the Bidding Documents at any time prior to the deadline for submission of bids. However in case of such amendment, the Bid submission date may be extended at the discretion of the purchaser.

6.2 Amendments made prior to submission of bid will be provided in the form of Addenda to the Bidding Documents and will be uploaded on the purchaser's website and will be binding on them. Bidder's should keep themselves appraised of the purchaser's website.

Preparation of Bids

7 **Language of Bid**

The bid, all correspondence and documents related to the bid shall be in English. For cases where any documents/certificates are not in English language, exact translation in English will have to be made & submitted duly certified by the local chapter of Chamber of Commerce of that country or Notary public with one copy of Original.

8 **Documents Accompanying the Bid**

All documentary evidence in support of claims must clearly be marked as to against which criteria the document is submitted.

8.1 The Bid shall be in three parts to be placed in one big sealed envelope as per ITB clause 13.1:

(i) Bid Security (Ernest Money Deposit-EMD)

(ii) Technical Bid consisting of the following:

- Qualification Requirements
- Commercial Bid
- Technical Bid
- Technical Evaluation Matrix

(iii) Financial Bid /Price Bid

8.1.1 Bid Security (EMD)

The EMD amount is to be submitted in a separately sealed and appropriately marked envelope as per Clause 11 of ITB.

8.1.2 Qualification Requirements

This part of the bid shall consist of the response to the Qualification Requirements and shall consist of:

a) A Forwarding Letter indicating the submission of the Bid. The letter should be signed by an authorized person holding the Power of Attorney.

b) Response to the Qualification Criteria given in ITB Clause 1 along with the documentary evidence of the Bidder's eligibility to bid.

8.1.3 Commercial Bid

Commercial bid shall consist of:

a) Signed copy of Tender Document (all pages to be signed & stamped) as given in Para 4.1.

b) Power of Attorney in original or duly notarized

A Power of Attorney, duly notarized, indicating that the person(s) signing the Bid has(ve) the authority to sign the bid and thus that the bid is binding upon the Bidder during full period of it's validity, in accordance with ITB clause 12.

c) Litigation History

Detailed information on any litigation or arbitration arising out of any contracts completed or under execution by it over the last five years. A consistent history of awards involving litigation against the Bidder may result in rejection of Bid (FORM # 11)

d) Un-priced Copy of Price Schedule (Blank Price Bid) FORM# 7.

e) Organisational structure of the Implementation partner.

f) Solvency Certificate of the IP.

8.1.4 Technical Bid

This part of the bid shall include:

a) Profile of the Bidder (FORM#1) and details of projects implemented (FORM # 2).

b) Functional Scope of job

c) Team deployment and CV of the team members (FORM # 3 & 4)

d) Project Methodology

e) Project organization structure

f) Project scheduling and staffing

g) Development and Implementation Plan (Project Plan) together with Activity Bar Chart and PERT Chart.

h) Methodology, Tools and documentation intended to be used by the Implementation Partner for implementation.

i) Interface strategy with legacy systems, standalone packages, automation systems etc.

j) Plan for change management, communication and knowledge Transfer

k) Training Schedule

l) Test Plans for SAP /EAI S/w.

m) High level risk and mitigation strategy

n) Extended support plan.

o) Recommended Hardware configuration required for the successful implementation of proposed solution alongwith the Bill of Materials for the supply of servers and hardware related to Data Centre.

The IP shall submit Soft copy also (in MS WORD/ Excel/ Power point/scanned) of all relevant documents.

8.1.5 Technical Evaluation Matrix

This part of the bid shall consist of the Responses to the Technical Evaluation Matrix as per Annexure-I.

Note: For furnishing documentary evidence/ information / details for which no standard formats have been enclosed in the Bidding Documents, Bidders may use their own formats.

8.1.6 Financial Bid

The Financial Bid shall consist of

a) Financial Bid Forwarding Letter (FORM # 6)

b) Price Schedule (FORM # 7)

8.2 For all the parts of the Bid excluding Bid Security (Ernest Money Deposit-EMD), the Bidder shall prepare one original and copies of the bid as per Bid Data Sheet (BDS), clearly marking as “Original Bid” and “Copy” as appropriate. In the event of any discrepancy between them the original shall govern.

8.3 The original and the copies of the bid, each consisting of the complete set of documents shall be signed by the Bidder or a person duly authorized to bind the Bidder to the Contract. All pages of the bid shall be numbered except for un-amended printed literature, which shall be initialled by the person signing the bid.

8.4 The bid shall contain no interlineations, erasures, or overwriting, except to correct errors made by the Bidder, in which case the person or persons signing the bid shall initial such corrections. Price should be quoted in number & words, in case there is a mismatch between the two, price quoted in words shall be considered.

9 Documents Establishing the Conformity

9.1 The Bidder shall furnish as part of its bid, documents establishing the conformity to the Bidding Documents.

9.2 The documentary evidence of the Bidding Documents shall be in the form of written descriptions, literature, diagrams, certifications, agreement copy, client certificates, customer orders, e-mail from company mail etc.

9.3 Project Methodology shall consist of standardized methodology / templates, approach, tools, monitoring mechanisms and quality frameworks that the bidder will use to ensure successful implementation and integration of the SAP system with other systems for the Purchaser.

9.4 The Development and Implementation Plan shall contain Contract Implementation Schedule showing the estimated duration, sequence, and interrelationship of all key activities needed to complete the Contract successfully.

9.5 A written confirmation that the Bidder shall accept responsibility for the successful implementation, integration and inter-operability of all components of the SAP system as required by the Bidding Documents.

10 **Bid Prices**

10.1 The Bid Price Schedule (FORM # 7), must be prepared in accordance with the instructions specified below:

a. The bidder shall quote the prices in the price schedule FORM # 7 attached to this Bid document.

b. Prices shall be quoted, in the prescribed Price Schedule by the bidder in strict compliance to the format of the Price Schedule.

c. Total amount quoted should be on turnkey, indivisible works contract basis, inclusive of all taxes, duties, levies, service tax (wherever applicable), installation, testing, commissioning and training.

d. Inspection/Certification of all work/services at all stages shall be done by Quality Review group and additionally by the Purchaser wherever the Purchaser so desires or by any third agency for which no extra charges shall be payable to the Bidder since all personal and incidental expenses of the Purchaser's Inspectors shall be borne by the Purchaser.

e. Conditional discount, if offered, shall not be considered for evaluation. Bidders separation of the price components as aforesaid will be solely for the purpose of facilitating the comparison of bids by the Owner and will not in any way limit the Owner's right to contract on any of the price basis/terms offered basis.

f. The cost of any other item / services, which are considered necessary for completion of the job, is deemed to have been included in the lump-sum prices.

11 **Bid Security (EMD)**

11.1 The Bidder shall furnish as part of its bid, a bid security (EMD) for an amount as per Bid Data Sheet (BDS), which shall be interest free and in the manner mentioned in ITB clause 11.2.

11.2 The bid security shall, at the Bidder's option, be in the form of a demand draft/bankers cheque from any Indian Scheduled Commercial Banks except Co-operative banks & Gramin banks, payable at Gurgaon. Bid security shall remain valid for sixty (60) days longer than the bid validity period. In case the validity of the offer is to be extended then validity of EMD will also to be extended accordingly.

11.3 Any bid not accompanied with the prescribed bid security, shall be rejected by the Purchaser as non-responsive.

11.4 The bid security of unsuccessful Bidders will be returned after issue of LOA to successful bidder.

11.5 The bid security of the successful Bidder will be returned when the Bidder has signed the Contract Agreement and furnished the required performance security (Security deposit).

11.6 The bid security may be forfeited:

(a) If a Bidder:

(i) Withdraws its bid during the period of bid validity specified in the BDS, except as provided under ITB Clause 16.3 or

(ii) Fails to accept the Purchaser's corrections of arithmetic errors in the Bidder's bid (if any), in accordance with ITB Clause 18.2 or

(iii) Submit false/fake documents or

(iv) Makes any modifications in the terms & conditions of the bid which are not acceptable to the purchaser.

(b) In the case of the successful Bidder, if the Bidder fails to:

(i) Sign the Contract in accordance with ITB Clause 24; or

(ii) Furnish performance security in accordance with ITB Clause 25.

12 **Period of Validity of Bid**

12.1 Bid shall remain valid for a period of 120 (One hundred and Twenty) days from the due date of submission of bid. A bid valid for a shorter period shall be rejected by the purchaser as being non-responsive.

12.2 In exceptional circumstances, the purchaser may solicit the Bidder's consent to an extension of the bid validity period. The request and responses thereto shall be made in writing or by e-mail. If a Bidder accepts to prolong the period of validity, the bid security shall also be suitably extended. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request will not be required or permitted to modify its bid.

Submission of Bids

13 **Sealing and Marking of Bids**

13.1 The Bidder shall prepare and seal the following three packets for his bid

- EMD – Superscribed Bid Security
- Technical Bid consisting of the Qualification Requirements, Commercial Bid, Technical Bid & the Technical Evaluation Matrix - Superscribed Technical Bid
- Financial Bid/ Price Bid - Superscribed Financial Bid

Each packet will contain the original and the copy of the bid in separate envelopes, duly marking the envelopes as "ORIGINAL BID" and "COPY" (Copies for EMD need not be submitted).

All the above 3 packets shall then be sealed in an single big outer envelope.

(a) The inner and outer envelopes shall be addressed to the Purchaser at the address given in the Bid Data Sheet (BDS) and

(b) The Inner & outer envelope shall bear the Contract name, the Invitation for Bids title and number, and the statement "DO NOT OPEN BEFORE----------(as mentioned in the BDS)".

(c) The inner envelopes shall also indicate the name and address of the Bidder so that the bid can be returned unopened in case it is declared "late."

(d) If the outer envelope is not sealed and marked as required by ITB Clause 13.1 above, the Purchaser will assume no responsibility for the bid's misplacement or premature opening.

14 **Deadline for Submission of Bids**

Bids must be received by the Purchaser at the address specified in the Bid Data Sheet (BDS) not later than the time and date stated in the BDS. The Purchaser may, at its discretion, extend this deadline for submission of bids in which case all rights and obligations of the Purchaser and Bidders will thereafter be subject to the deadline as extended.

15 **Late Bids**

Any bid received by the Purchaser after the bid submission deadline prescribed by the Purchaser in the BDS for ITB Clause–14, will be rejected and returned unopened to the Bidder.

16 **Modification and Withdrawal of Bids**

16.1 The Bidder may modify or withdraw its bid after submission, provided that written notice of the modification or withdrawal is received by the Purchaser prior to the deadline prescribed for bid submission.

16.2 The Bidder's modifications shall be prepared, sealed, marked, and dispatched as follows:

a) The Bidders shall provide an original and number of copies as in original bid, of any modification(s) to its bid, clearly identified as such, in two inner envelopes duly marked "BID MODIFICATIONS—ORIGINAL" and "BID MODIFICATIONS—COPY." The inner envelopes shall be sealed in an outer envelope, which shall be duly marked "BID MODIFICATIONS."

b) Other provisions concerning the marking and dispatch of bid modifications shall be in accordance with ITB Clauses 13.1 & 13.2

16.3 A Bidder wishing to withdraw its bid shall notify the Purchaser in writing prior to the deadline prescribed for bid submission. The withdrawal notice shall be addressed to the Purchaser at the address named in the BDS and bear the Contract name, and the words "Bid Withdrawal Notice." Bid Withdrawal Notices received after the bid submission deadline will be ignored and the submitted bid will be deemed to be a valid submitted bid.

16.4 No bid may be withdrawn in the interval between the bid submission deadline and the expiration of the bid validity period specified in ITB Clause 14. Withdrawal of a bid during this interval may result in the forfeiture of the Bidder's Bid Security, pursuant to ITB Clause 11.6.

Bid Opening and Evaluation

17 **Opening of Bids by Purchaser**

17.1 Bids (as defined in ITB Clause 8.1 received before the dead line of the submission of the bid will be opened on the date and time of opening mentioned in the Bid Data Sheet (BDS). Bidders wishing to be present at the time of such opening may send their duly authorized representative.

The bids shall be opened in the following sequence:

- EMD
- Technical Bid
- Financial Bid/ Price Bid

17.2 The Purchaser will open the Technical Bid on the date, time and place which will be communicated to the bidders as mentioned in the BDS. The bidders may send their representatives to attend the opening.

The purchaser will open the financial Bids as defined in ITB Clause 19 (b) on the date, time and place, which will be communicated to the bidders. The Bidders may send their representatives to attend the opening.

17.3 Withdrawal notices shall, however, be read out at the deadline time of the submission of the Bids, and the envelope of the corresponding bid shall not be opened for evaluation.

17.4 For the Financial Bid, Bids shall be opened one at a time, reading out the name of the Bidder; the bid price, and any other details, as the Purchaser may consider appropriate.

17.5 Financial Bids that are neither opened nor read out at the bid opening shall not be considered for the Contract Award.

18 Preliminary Examination of Bids

18.1 The Purchaser will examine the bids to determine whether they are complete, whether any computational errors have been made, whether required securities (EMD amount) have been furnished, whether the documents have been properly signed, and whether the bids are generally in order. The Purchaser will ensure that each bid is from an eligible Bidder.

18.2 Arithmetical errors will be rectified on the following basis. If there is a discrepancy between the total amount obtained by actual calculation using the components quoted (viz. base price, taxes, duties, any other charges etc.) and the total amount quoted in the price bid, then the quoted components will be considered for arriving at the actual total amount. If there is a discrepancy between words and figures, the amount in words will prevail. If a Bidder does not accept the correction of errors, its bid will be rejected and its bid security (EMD) may be forfeited.

18.3 The Purchaser may waive any minor nonconformity, or irregularity in a bid that does not constitute a material deviation, provided such waiver does not prejudice or affect the relative ranking of any Bidder. However, the purchaser may ask the bidders for any additional clarification or supporting documents required for the fulfilment of the tender evaluation.

18.4 Prior to the detailed evaluation, the Purchaser will determine whether each bid is complete, and is substantially responsive to the Bidding Documents. For the purposes of this determination, a substantially responsive bid is one that conforms to all the terms, conditions, and specifications of the Bidding Documents without material deviations, exceptions, objections, conditionality or reservations. A material deviation, exception, objection, conditionality, or reservation is:

a) one that limits in any substantial way the scope, quality, or performance of the desired system; or

b) one that limits, in any substantial way that is inconsistent with the Bidding Documents, the Purchaser rights or the successful Bidder's obligations under the Contract; and

c) One that the acceptance of which would unfairly affect the competitive position of other Bidders who have submitted substantially responsive bids.

18.5 If a bid is not substantially responsive, it will be rejected by the Purchaser and may not subsequently be made responsive by the Bidder by correction of the nonconformity. The Purchaser's determination of bid responsiveness will be based only on the contents of the bid submitted and subsequent clarifications if sought by the purchaser.

19 Evaluation and Comparison of Bids

The Purchaser will evaluate and compare the bids that have been determined to be substantially responsive.

The evaluation of responsive bids shall be done in 3 stages:

(a) STAGE-I: RESPONSE TO QUALIFICATION REQUIREMENTS

These are mandatory Qualification Requirements to be met by the Implementation Partner. Only those Bidders who meet all the requirements as provided in Qualification Requirement (ITB Clause 1) in this tender document shall be considered for Stage II evaluation.

(b) STAGE-II: EVALUATION OF TECHNICAL & COMMERCIAL BIDS

(i) This shall be the second stage of the evaluation by the Purchaser. Only those Bidders who cross the threshold level of technical and commercial evaluation indicated in Para (ii) to (vi) below and adhere to the purchaser's technical and commercial requirements shall be considered for Stage III evaluation.

(ii) Commercial and Technical Bid Part of the Bidder shall be opened and evaluated for acceptability of commercial terms and technical suitability. The Bidders should meet the commercial conditions as defined in the bidding documents.

(iii) An Technical Evaluation Committee comprising of members from RITES Ltd. and their Consultant, MDI will, jointly evaluate the presentation to be given by the bidders on the Critical Business Processes of RITES & their Approach & Methodology for the project at RITES Corporate Office once the technical bid and commercial conditions of the contract are acceptable to the purchaser.

(iv) Evaluation of the Technical Evaluation Matrix shall be based on the following parameters and associated weightage as follows:

Characteristic	**Score**
Credentials of the IP	75
Presentation by the IP on the Critical Business Processes of RITES & their Approach & Methodology for the project	25
Total	100

(v) Threshold value for evaluation of the Technical Evaluation Matrix is 80 marks out of 100.

(vi) Bids of Bidders failing to attain the threshold value on technical evaluation matrix as in (v) above shall be returned.

(c) STAGE -III: EVALUATION OF THE FINANCIAL BID

(i) Total cost of ownership (TCO) will be calculated by adding Financial Bid price of all components as in Table A of FORM # 7.

(ii) The Bid having the Lowest TCO shall be termed as the Lowest Evaluated Bid (L1) and will be awarded the project.

20 **Contacting the Purchaser**

20.1 From the time of bid opening to the time of Contract award, if any Bidder wishes to contact the Purchaser on any matter related to the bid, he shall do so in writing.

20.2 If a Bidder tries to influence the Purchaser directly or otherwise, interfere in the bid evaluation process and the Contract award decision, his bid will be rejected.

21 **Award Criteria**

Pursuant to ITB Clauses 17 and 19, the Bidder whose financial bid has the Lowest TCO shall be termed as the Lowest Evaluated Bid (L1) and shall be eligible for award of contract.

22 **Purchaser's Right to Accept or reject any or all Bids**

22.1 The Purchaser reserves the right to accept or reject any bid or to annul the bidding process and reject all bids at any time prior to Contract award, without thereby incurring any liability to the Bidders.

22.2 The Purchaser reserves the right to negotiate with the Bidder who becomes eligible for award of the contract as per clause 21 of ITB.

23 **Letter of Award**

23.1 Prior to the expiration of the period of bid validity, the Purchaser will notify the successful Bidder in writing that its bid has been accepted. In case of any unforeseen circumstances if LOA is not issued within bid validity period, the bidder has to extend the bid validity as desired by the Purchaser.

23.2 The notification of award will constitute the formation of the Contract.

24 **Signing of Contract**

24.1 Letter of Award (LOA) shall be issued by the purchaser to the successful bidder inviting him to visit RITES Corporate Office, Gurgaon for finalisation & signing of the contract.

24.2 Contract document has to be signed within ten (10) days of date of LOA.

24.3 The contract agreement to be signed in English language in two originals, an each for purchaser and IP.

25 **Performance Security (Security Deposit – SD)**

25.1 The successful bidder shall furnish the Performance Security within seven (7) days following signing of Contract. However this may be extended by the Purchaser at his discretion on submission of reasonable grounds by the IP but in no case the submission date shall be allowed to exceed beyond 10 days of signing of the contract. The security shall be in accordance with the clause 11 of Conditions of Contract, using the Performance Security Form provided in the Bidding Documents as per FORM # 9.

25.2 Failure of the successful Bidder to comply with the requirements of ITB Clauses 25.1 shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security and IP will be liable for contractual action as per the contract.

Section IV CONDITIONS OF THE CONTRACT (CC)

Contract and Interpretation

1 Definitions

In this Contract, the following terms shall be interpreted as indicated below.

(a) *Contract elements*

(i) "Contract" means the Contract Agreement entered into between the Purchaser and the Contractor, together with the Contract Documents. The Contract Agreement and the Contract Documents shall constitute the Contract, and the term "the Contract" shall in all such documents be construed accordingly.

(ii) "CC" means the Conditions of Contract.

(iii) "Contract Documents" means the documents specified in CC Clause 2.2.

(iv) "Contract Agreement" means the agreement entered into between the Purchaser and the Contractor using the Form of Contract Agreement contained in the FORM # 8 of Section V of the Bidding Documents and any modifications to this form agreed to by the Purchaser and the Contractor. The date of the Contract Agreement shall be recorded in the signed form

(v) "Implementation Schedule" means the Implementation Schedule documented in the Agreed and Finalized Project Plan.

(vi) "Contract Price" means the price or prices as specified in Clause 4 of the Contract Agreement

(vii) "Bidding Documents" refers to the collection of documents issued by the Purchaser to instruct and inform Bidders of the processes for bidding, selection of the winning bid, and Contract formation, as well as the Contractual conditions governing the relationship between the Purchaser and the Contractor.

(b) Entities

(i) "Purchaser" means the organization purchasing the "SAP Implementation services from the Implementation Partner" as specified in the Bid Data Sheet (BDS).

(ii) "Project Coordinator" means the person appointed by the Purchaser in the manner provided in CC Clause 15.1 to perform the duties delegated by the Purchaser.

(iii) "Contractor" means that Bidder whose bid to perform the Contract has been accepted by the Purchaser and is named as such in the Contract Agreement

(iv) "Contractor's Representative" means any person nominated by the Contractor and named as such in the Contract Agreement and approved by the Purchaser in the manner provided in CC Clause 15.3 (Contractor's Representative) to perform the duties delegated by the Contractor.

(c) Subject

(i) "Services" means all technical, logistics, management and any other Services to be provided by the Contractor under the Contract to supply hardware, develop, install and implement the SAP system, customize, integrate, make operational, stabilization support and extended support of the proposed SAP system. Such Services may include, but are not restricted to Installation, Commissioning, Go-Live, stabilization and Training.

(ii) "The Project Plan" means the document to be developed by the IP and approved by the Purchaser, pursuant to CC Clause 16, based on the requirements of the Contract and the Development and Implementation Plan included in the Contractor's bid. For the sake of clarity, "the Agreed and Finalized Project Plan" refers to the version of the Project Plan approved by the Purchaser, in accordance with CC Clause 16.2. The project plan may be changed/ modified during the course of the project. Should the Project Plan conflict with the Contract in any way, the relevant provisions of the Contract, including any amendments, shall prevail.

(iii) "SAP Software/SAP Product" means Software that provides the operating and management instructions for the underlying hardware, databases and such other Software as the parties may agree in writing to be SAP Software/ SAP Product.

(iv) "Materials" means all documentation in printed or printable form and all instructional and informational aides in any form (including audio, video, and text in hard/ soft copies) and on any medium, provided to the Purchaser under the Contract.

(v) "Intellectual Property Rights" means any and all copyright, trademark, patent, and other intellectual and proprietary rights, title and interests worldwide, whether vested, contingent or future including without limitation all economic rights and all exclusive rights to reproduce, fix, adapt, modify, translate, create derivative works from, extract or re-utilize data from, manufacture, introduce into circulation, publish, distribute, sell, license, sublicense, transfer, rent, lease, transmit or provide access electronically, broadcast, display, enter into computer memory, or otherwise use any portion or copy, in whole or in part, in any form, directly or indirectly, or to authorize or assign others to do so.

(d) Activities

(i) "Delivery" means the transfer of the system from the Contractor to the Purchaser.

(ii) "Go-Live" (Commissioning) means the SAP system is available for live transactions following data conversion as per the definition in Agreed and Finalised Project Plan. Go-Live Acceptance tests are conducted in accordance with the provisions of CC Clause 16.

(iii) "Go-Live Acceptance Tests" means the tests specified in the Technical Requirements and Agreed and Finalized Project Plan to be carried out to ascertain whether the SAP System is able to attain the functional and performance requirements (relating to commissioning) in production/ live environment as specified in the Scope of Work and Agreed and Finalized Project Plan, in accordance with the provisions of CC Clause 16.

(iv) "Go-Live Acceptance" means the acceptance by the Purchaser that the SAP system is capable of attaining the functional and performance requirements (relating to Go-Live) as specified in the Scope of Work and Agreed and Finalized Project Plan in accordance with CC Clause 16.

(v) "Stabilization Period" " means successful running of the full system for at least three months from Go-Live.

(vi) "Stabilization Acceptance Test" (PG Test) means the tests specified in the Technical Requirements and Agreed and Finalized Project Plan to be carried out to ascertain whether the SAP System, or a specified Subsystem, is able to attain the functional and performance requirements in production/ live environment as specified in the Scope of Work and Agreed and Finalized Project Plan.

(vii) "Stabilization Acceptance" means the acceptance by the Purchaser that the SAP system is capable of attaining the functional and performance requirements (relating to Go-Live) as specified in the Scope of Work and Agreed and Finalized Project Plan in accordance with CC Clause 16.

(viii) "Final acceptance" means the acceptance by the purchaser after successful completion of the defect liability period.

(e) Place and time

(i) "Day" means calendar day of the Gregorian calendar.

(ii) "Week" means seven (7) consecutive Days, beginning the day of the week as is customary in the Purchaser's Country.

(iii) "Month" means calendar month of the Gregorian calendar.

(iv) "Year" means a period of twelve (12) consecutive Months.

(v) "Effective Date" means the date of signing of the Contract Agreement, for the purpose of determining the Supply, Development, Implementation, Integration, Stabilisation and Acceptance dates for the SAP System.

(vi) "Contract Period" is the time period during which this Contract governs the relations and obligations of the Purchaser and Contractor in relation to the SAP implementation project.

2 Contract Documents

2.1. Subject to Clause CC 2.2, all documents forming part of the Contract (and all parts of these documents) are intended to be correlative, complementary, and mutually explanatory. The Contract shall be read as a whole.

2.2. The order of precedence of the Contract documents will be as follows:

(a) Letter of Acceptance

(b) Addenda, if any

(c) Conditions of Contract as per RITES Tender document

(d) Scope of the Work and Technical Requirements

(e) Bid proposal (Financial)

(f) Any other item as applicable +

3 Interpretation

3.1 Language

All Contract Documents, all correspondence, and communications to be given shall be in English, and the Contract shall be construed and interpreted in accordance with that language.

3.2 Singular and Plural

The singular shall include the plural and the plural, the singular except where the context otherwise requires.

3.3 Headings

The headings and marginal notes in the CC are included for ease of reference and shall neither constitute a part of the Contract nor affect its interpretation.

3.4 Persons

Words importing persons or parties shall include firms, corporations, and government entities.

3.5 Entire Agreement

The Contract constitutes the entire agreement between the Purchaser and Contractor with respect to the subject matter of Contract and supersedes all communications, negotiations, and agreements (whether written or oral) of parties with respect to the subject matter of the Contract made prior to the date of Contract.

3.6 Amendment

No amendment or other variation of the Contract shall be effective unless it is in writing, is dated, expressly refers to the Contract, and is signed by a duly authorized representative of each party to the Contract.

3.7 Severability

If any provision or condition of the Contract is prohibited or rendered invalid or unenforceable such prohibition, invalidity, or unenforceability shall not affect the validity or enforceability of any other provisions and conditions of the Contract.

4 a) Governing Law

The Contract shall be governed by and interpreted in accordance with the laws of India.

b) Jurisdiction

The to be finalised contract will be deemed to have been executed at Gurgaon and only the court at Delhi will have the jurisdiction to try any suit or proceeding arising out of the contract.

5 Settlement of Disputes

5.1 **Mutual Settlement of Disputes**

Except where otherwise provided for in the contract, all questions and dispute relating to any matter directly or indirectly connected with this agreement shall in the first place be resolved through mutual discussions, negotiations, deliberation and consultations between both the parties.

5.2 **Conciliation**

If the effort to resolve all or any of the disputes through mutual settlement fails, such disputes shall be referred to the conciliator to be appointed by the mutual agreement of both the Purchaser and the Contractor.

The conciliator shall make the settlement agreement after the parties reach agreement and shall give an authenticated copy thereof to each of the parties.

The settlement agreement shall be final and binding on the parties. The settlement agreement shall have the same status and effect of an arbitration award.

Arbitration

Any disputes, differences, whatsoever, arising between the parties out of or relating to the construction, meaning, scope, operation or effect of this Contract shall be settled between the Purchaser and the Contractor amicably. If however, the Purchaser and the Contractor are not able to resolve their disputes / differences amicably as aforesaid the said disputes / differences shall be settled by Arbitration in accordance with the Rules of Arbitration and the award made in pursuance thereof shall be binding on the parties. The arbitration shall be governed and regulated in all respect according to Laws of India. The Arbitration proceedings, in case of foreign Contractor shall be regulated and governed by the rules of Arbitration and Conciliation of International Chamber of Commerce, Paris. The venue shall be New Delhi. The arbitration proceedings in case of Indian Contractor shall be regulated and governed by Indian Arbitration and Conciliation Act, 1996, or such modification thereof. The venue shall be Delhi, India.

5.3 **General**

(a) There shall be no suspension of work on account of arbitration provided that the obligations of the Purchaser and the Contractor shall not be altered by reasons of

arbitration being conducted during the progress of Works. Neither party shall be entitled to suspend the work to which the dispute relates on account of arbitration.

(b) The cost of arbitration shall be borne by the respective parties. The cost shall inter-alia include the fees of the arbitration(s) as per the rates fixed by the arbitrator from time to time.

(c) The parties agree to comply with the awards resulting from arbitration and waive their rights to any form of appeal insofar as such waiver can validly be made.

Subject Matter of Contract

6 Time for Commencement and Go-Live Acceptance

The Contractor shall commence work on the SAP System within 14 (fourteen) days from the date of Letter of Award (LOA). The Contractor shall thereafter proceed with the supply, development, implementation and integration of the SAP System in accordance with the time schedule specified in the Agreed and Finalized Project Plan. The Contractor shall achieve Go-Live Acceptance / stabilisation acceptance of the SAP System in accordance with the time schedule specified in the Agreed and Finalized Project Plan, or within such extended time to which the Contractor shall be entitled under CC Clause 24.

7 Contractor's Responsibilities

7.1 Without prejudice to any express provision in the contract, Contractor shall be solely responsible for any consequence resulting from any delay, lack of performance, breach of agreement and or any default caused solely & directly by the Contractor.

7.2 The Contractor shall provide personnel who, under the Contract Agreement shall not engage in any other business or professional activity in India or abroad during their work at RITES project site.

7.3 Contractor shall in any case be responsible and liable for any acts and omissions of its employees and/or sub-contractors and make good RITES for any loss or claim that RITES may incur.

7.4 Contractor shall hold harmless and make good RITES from and against any and all claims, damages, expenses and cost, including those asserted by its employees, process licensors, patent holder, sub-contractors and/or by any third party arising directly or indirectly out of the performance of the contract.

7.5 The liability of Contractor under the agreement shall not be limited in any way by any document, information or recommendation provided by any part of the terms of the contract.

7.6 Contractor shall remain liable for any damages due to its gross negligence within the next three years after the issuance of the provisional acceptance certificate of the contract.

7.7 The amount of liability of Contractor's shall be limited to 100% of the contract price.

7.8 Consequential loss including indirect damages, or loss of profit, business, revenue, goodwill, anticipated savings or data / damages are excluded from the claim for compensation

8 Purchaser's Responsibilities

8.1 The Purchaser shall ensure the availability of all information and/or data to be supplied by the Purchaser to the Contractor.

8.2 The Purchaser shall be responsible for timely provision of core team and necessary resources, information, and decision making under its control that are necessary to reach an agreed and Finalized Project Plan (pursuant to CC Clause 16.2).

8.3 The Purchaser shall provide the office space, furniture and other essential facilities within its premises for the Contractor's team in accordance with the Agreed and Finalised Project Plan.

8.4 The Purchaser shall be responsible for timely provision of resources, necessary access, and information for the Supply, Development, Implementation and Integration (including Commissioning Acceptance) and Go-Live (including Go-Live Acceptance) of the SAP as identified in the Agreed and Finalized Project Plan, except where provision of such items is explicitly identified in the Contract as being the responsibility of the Contractor.

8.5 Unless otherwise specified in the Contract or agreed upon by the Purchaser and the Contractor, the Purchaser shall provide personnel, to properly carry out Commissioning including (Commissioning Acceptance), Go-Live (including successful running and stabilization of the system), at or before the time specified in the Agreed and Finalized Project Plan.

8.6 The Purchaser will designate appropriate staff for the training courses to be given by the Contractor and shall endeavour to make all appropriate logistical arrangements for such training as specified in the CC, the Agreed and Finalized Project Plan, or other parts of the Contract.

8.7 Purchaser shall ensure SAP licence to use, implement, integrate and / or customize the SAP product by Contractor as required by the scope of this engagement in order to carry out the implementation services.

Payment

9 Contract Price

9.1 The Contract Price shall be as specified in Clause 4 of the Contract Agreement (FORM # 8).

9.2 All supplies and services required for the Contract are priced inclusive of all incidental costs (such as out of pocket expenses, office support, communications, printing of materials), and inclusive of all taxes, duties & levies paid or payable in any country, upon rendering of the services as on the due date of bid submission. Statutory variation in all statutory taxes, duties and levies in India during the contractual period except the extended period of contract & extension due to the reasons attributable to Contractor, shall be to the purchaser's account.

9.3 The Contractor shall be deemed to have satisfied itself as to the correctness and sufficiency of the Contract Price, which shall except as otherwise provided for in the Contract, cover all its obligations under the Contract.

10 Terms of Payment

10.1 The Contractor's request for payment shall be made to the Purchaser in writing, accompanied by an invoice describing, as appropriate, the milestone completed. The Contract Price shall be paid in Indian Rupees in accordance with the Payment Schedule (CC clause 10.3).

10.2 No payment made by the Purchaser herein shall be deemed to constitute Go-Live Acceptance by the Purchaser of the system.

Payments shall be made promptly by the Purchaser, but in no case later than thirty (30) days after submission of an invoice along with the stipulated acceptance/delivery certificate signed by competent authority / Project Coordinator / Authorized Representative.

10.3 **Payment Schedule**

Note: Contractor shall raise invoice on completion of milestone activities (as applicable) which are listed below:

Phase I – Pilot Phase

	Description of Task	**Payment**	**Milestone**
I	**Implementation, Configuration, Bespoke Development, Integration, Training and Stabilization Support Service Costs**		
1	Finalization of AS-IS process and project plan	10% of price as per Sl. No. 1 of the Price Schedule.	Upon completion of all deliverables upto Project Preparation Phase and acceptance by RITES
2	TO-BE process mapping	20% of price as per Sl. No. 1 of the Price Schedule	Upon completion of all deliverables upto and including TO-BE process Report and acceptance by RITES
3	Testing the SAP software	(a) 10% of Price as per Sl. No. 1 of the Price Schedule (b) 15% of Price as per Sl. No. 1 of the Price Schedule	Upon completion of all deliverables upto and including Successful Completion of all Unit Testing of SAP S/w and Acceptance by Quality Review Group and RITES. Upon completion of all deliverables upto and including Successful Completion of all User Acceptance Test (UAT) of SAP S/w and Acceptance by Quality Review Group and RITES.
4	User Training	10% of Price as per Sl. No. 1 of the Price Schedule	Upon Completion of all End User & Technical trainings and on supply of manuals
5	Pilot Phase Go-live	20% of Price as per Sl. No. 1 of the Price Schedule	On successful completion of Go-Live Acceptance Test and Issue of Pilot Phase Go-Live Acceptance certificate from RITES
6	Stabilization Acceptance	15% of Price as per Sl. No. 1 of the Price	On successful completion of Stabilization

		Schedule	Acceptance Test and Issue of Stabilization Acceptance Certificate from RITES
II	**Quality Review and Audit Charge by the ERP OEM (SAP)**		
1	Quality Review and Audit Charge by the ERP OEM (SAP)	50% of Price as per Sl. No. 2 of the Price Schedule	On submission of Audit Report for Business Blueprint and acceptance by RITES
2		50% of Price as per Sl. No. 2 of the Price Schedule	On submission of Audit Report for Pilot Go-Live and acceptance by RITES.
III	**Charges for the supply of servers and associated peripherals**		
1	Supply of Servers and associated peripherals	50% of Price as per Sl. No. 5 of the Price Schedule	Upon successful commissioning of Development, Training and Quality Servers at the premises of the purchaser and issue of successful commissioning certificate by RITES.
2		50% of Price as per Sl. No. 5 of the Price Schedule	Upon successful commissioning of Production, Database, Storage servers etc. at the premises of the purchaser and issue of successful commissioning certificate by RITES.
IV	**Data Centre charges**		
3	Supply of hardware components for the Data Centre	50% of Price as per Sl. No. 6 of the Price Schedule	Upon supply of hardware components required for the Data Centre at the premises of the purchaser and issue of receipt certificate by RITES.
4	Completion of Civil & Electrical works for the Data Centre	50% of Price as per Sl. No. 6 of the Price Schedule	Upon completion of civil & electrical works for the Data Centre and upon issue of successful commissioning certificate by RITES.

Phase II – Roll-out Phase

	Description of Task	**Payment**	**Milestone**
I	**Roll –out to all the remaining sites of RITES**		
1	Roll-out charges for the remaining locations of RITES	100% of price as per Sl. No. 3 of the Price Schedule	On successful completion of Roll-out of SAP system to all the locations of RITES and Issue of Roll-out Phase Go-Live Acceptance certificate from RITES
II	**Extended Support Charge**		
1	Extended Support Charge for 1 year	20%, 20%, 20% & 40% of price as per Sl. No. 4 of the Price Schedule on each quarter till 1year	On successful completion of Extended Support period (Quarter). The last instalment of 40% shall be released upon issue of Final Acceptance Certificate from RITES

In order to enable RITES to avail tax / duty credit, the bidder shall ensure submission of necessary documents duly approved by tax authorities, as per relevant rule, to Paying Authority of RITES along with the bill. Unless this is submitted, payment of the bill shall be withheld to the extent of such tax / duty component covered.

11 Performance Securities

11.1 Issuance of Securities

The Contractor shall provide the securities in favour of the Purchaser at the times and in amount, manner and form specified below.

11.2 Performance Security

The Contractor shall, within seven (7) working days from the date of Signing of the Contract, provide a Security for the due performance of the Contract for an amount equal to 10% of the contract value. The Performance Security will be valid for twenty eight (28) days after the date of completion of Stabilization Acceptance of the project.

The security shall be in one of the following forms

(a) Bank Guarantee (in the format as provided in FORM # 9 of the bidding documents) issued by an Indian Scheduled Commercial bank except co-operative banks & Gramin banks payable at Gurgaon/Delhi.

(b) Demand Draft, Pay Order/ Bankers cheque in favour of RITES payable at Gurgaon/Delhi.

11.3 In case of delay in submitting the Performance Security, interest @ 10% p.a. is leviable on the contractor.

11.4 The performance security is likely to be forfeited if the Contractor is unable to achieve go live acceptance as per time schedule given in the Agreed and Finalized Project Plan.

12 Taxes and Duties

Except as otherwise specifically provided in the Contract as reimbursable, the Contractor shall pay and bear all taxes, duties, levies, and charges (referred as taxes) assessed on the Contractor with the Goods and Services supplied under the Contract. Any new taxes, duties, levies introduced within India arising between contract date and original contractual delivery date shall be on purchasers account. However, increase in the rates of existing taxes, duties or levies shall be borne by the contractor.

Industrial and Intellectual Property

13 Intellectual Property Rights

13.1 In order to perform the services Contractor must obtain at its sole account, the necessary assignments, permits and authorizations from the title holder of the corresponding parents, models, trademarks, names or other protected rights and shall keep RITES harmless and indemnify RITES from and against claims, proceedings, damages, costs and expenses (including but not limited to legal costs) for and/or on account of infringements of said parents, models, trademarks names or other protected rights.

13.2 The Intellectual Property Rights in the SAP base products and Standard materials and methodologies shall remain vested in the owner of such rights. The purchaser shall be granted non-exclusive and paid up license to use the SAP base products in accordance with the terms of its licence from SAP OEM and standard materials including modifications thereto for the purposes agreed herein. For any modification or bespoke development made to the software, the IPR shall belong to RITES. However the purchaser has the rights to transfer the SAP base product licenses to any Region/ Project Office/ Site Office of RITES or its parent, subsidiary or affiliate as given in clause 3 of SOW.

13.3 Contractor shall not be assigning or handing over any rights in its pre-existing intellectual property and proprietary information or process to the purchaser. However, Contractor will grant Purchaser an unlimited, perpetual, non-exclusive, non-transferable licence to use the same for internal use within the purchaser's organization, their affiliates and subsidiaries. Also, any specific new IPR arisen during the course of implementation of this project will be with RITES.

13.4 All documents, reports information, data etc collected & prepared by Contractor in connection with the scope of work will be the property of RITES and shall be submitted to RITES.

13.5 Contractor shall not be entitled either directly or indirectly to make use of the documents, reports given by RITES for carrying out of any services with any third parties.

13.6 Contractor shall not without the prior written consent of RITES be entitled to publish studies or descriptive article with or without illustrations or data in respect of or in connection with the performance of services.

14 Confidential Information

14.1 The Purchaser and the Contractor ("the receiving party") shall each keep confidential and shall not, without the written consent of the other party to this Contract ("the Disclosing Party"), divulge to any third party any documents, data, or other information of a confidential nature ("Confidential Information"), that has been marked "Confidential" –("Confidential Information")

14.2 Notwithstanding the above the Purchaser may furnish Confidential Information of the Contractor:

(i) To its support service Contractor's to the extent reasonably required for them to perform their work under their support service Contracts; and

(ii) To its affiliates and subsidiaries in which event the Receiving Party shall ensure that the person to whom it furnishes Confidential Information of the Disclosing Party is aware of and abides by the Receiving Party's obligations as if that person were party to the Contract in place of the Receiving Party;

(iii) And in such case Contractor shall not be liable for any breach of confidentiality obligations by the receiving party as stated in sub clauses (i) and (ii) above

14.3 The obligation of a party under CC Clauses 14.1 and 14.2 above, however, shall not apply to that information which:

(a) Now or hereafter enters the public domain through no fault of the Receiving Party;

(b) Can be proven to have been possessed by the Receiving Party at the time of disclosure and that was not previously obtained, directly or indirectly, from the Disclosing Party;

(c) Otherwise lawfully becomes available to the Receiving Party from a third party that has no obligation of confidentiality;

(d) Independently developed by the Receiving Party without the use of that Information;

(e) Required to be provided under any law or process of law duly executed.

14.4 Contractor may also disclose to its affiliates and subsidiaries the confidential information of the purchaser in connection with the performance by Contractor of the project.

Development, Implementation, Go-Live and Stabilization

15 Representatives

15.1 **Project Coordinator**

The Purchaser shall appoint and notify the Contractor in writing the name of the Project Coordinator within fourteen (14) days of signing of the Contract. The Purchaser may also from time to time appoint some other person as the Project Coordinator in place of the person previously so appointed and shall give a notice of the name of such other person to the Contractor without delay. The Project Coordinator shall have the authority to represent the Purchaser on all day-to-day matters relating to the implementation of the SAP System or arising from the Contract. All notices, instructions, orders, certificates, approvals, and all other communications under the Contract shall be given by the Project Coordinator, except as otherwise provided for in this Contract.

All notices, instructions, information, and other communications given by the Contractor to the Purchaser under the Contract shall be given to the Project Coordinator, except as otherwise provided for in this Contract.

15.2 The Project Coordinator may at any time delegate/revoke to any person any of the powers, functions, and authorities vested in him or her.

15.3 **Contractor's Representative**

15.3.1 The Contractor shall appoint the Contractor's Representative within fourteen (14) days of the signing of the Contract and shall request the Purchaser in writing to approve the person so appointed. The request must be accompanied by a detailed CV for the nominee, as well as a description of any responsibility other than the implementation of the SAP System that the nominee would retain while performing the duties of the Contractor's Representative. If the Purchaser does not object to the appointment within fourteen (14) days, the Contractor's Representative shall be deemed to have been approved. If the Purchaser objects to the appointment within fourteen (14) days

giving the reason therefore, then the Contractor shall appoint a replacement within fourteen (14) days of such objection in accordance with this CC Clause.

15.3.2 The Contractor's Representative shall have the authority to represent the Contractor on all day-to-day matters relating to the implementation of the SAP system or arising from the Contract. The Contractor's Representative shall give to the Project Coordinator all the Contractor's notices, instructions, information, and all other communications under the Contract.

All notices, instructions, information, and all other communications given by the Purchaser or the Project Coordinator to the Contractor under the Contract shall be given to the Contractor's Representative or, in its absence, its deputy, except as otherwise provided for in this Contract.

15.3.3 The Contractor shall not revoke the appointment of the Contractor's Representative without the Purchaser's prior written consent, which shall not be unreasonably withheld. This provision shall however not apply to a case of retirement, resignation or termination of employment of the Contractor's Representative for whatever reason by the Contractor. If the Purchaser consents to such an action, the Contractor shall appoint another person of equal or superior qualifications as the Contractor's Representative within seven days of separation of the erstwhile person.

15.3.3.1 The Contractor's Representative and staff are obliged to work closely with the Purchaser's Project Coordinator and act within their own authority, and abide by directives issued by the Purchaser that are consistent with the terms of the Contract. The Contractor's Representative is responsible for managing the activities of its personnel.

15.3.3.2 The Contractor's Representative may, subject to the written approval of the Purchaser (which shall not be unreasonably withheld), at any time delegate to any person any of the powers, functions, and authorities vested in him or her. Any such delegation may be revoked at any time. Any such delegation or revocation shall be subject to a prior notice signed by the Contractor's Representative and shall specify the powers, functions, and authorities thereby delegated or revoked. No such delegation or revocation shall take effect unless and until a copy of such a notice has been delivered to the Purchaser and the Project Coordinator.

15.3.3.3 Any act or exercise by any person of powers, functions and authorities so delegated to him or her in accordance with CC Clause 15.3.3.2 shall be deemed to be an act or exercise by the Contractor's Representative.

15.4 **Objections and Removals**

15.4.1 The Purchaser may by notice to the Contractor object to any representative or person employed by the Contractor in the execution of the Contract who, in the reasonable opinion of the Purchaser, may have behaved inappropriately, be incompetent, or be negligent. The Purchaser shall provide evidence of the same, whereupon the Contractor shall remove such person from work on the SAP implementation project.

15.4.2 If any representative or person employed by the Contractor is removed in accordance with CC Clause 15.4.1, the Contractor shall, where required, promptly appoint a replacement.

16 Project Plan

16.1 In close cooperation with the Purchaser and based on the Preliminary Project Plan included in the Contractor's bid, the Contractor shall develop a detailed Project Plan encompassing all the activities specified in the Contract.

16.2 The Contractor shall formally present to the Purchaser the Project Plan in accordance with the Technical Requirements. The Contractor has to specify the strategy and methodology with time frame and the synchronization of various phases of project

to ensure completion of project in time. The project plan shall also include a PERT chart describing the activities, resources required on the time for completion. The plan shall also bring out the critical areas needing continuous attention of the purchaser. The Agreed & Finalised Project Plan should have the same Go-Live date.

16.3 If required, the impact on the Implementation Schedule of modifications agreed during finalization of the Agreed and Finalized Project Plan shall be incorporated in the Contract by amendment.

16.4 The Contractor shall undertake to develop, implement, integrate, commission and ensure the go-live and stabilization of the System in accordance with the Agreed and Finalized Project Plan and the Contract.

16.5 The Progress and other reports specified shall be prepared by the Contractor and submitted to the Purchaser in the format and frequency specified in the Agreed and Finalized Project Plan.

16.6 Changes to the Project Plan, if required, shall be made with the mutual consent of the Purchaser and the Contractor.

17 Design and Development

17.1 Technical Specifications

17.1.1 The Contractor shall execute the basic and detailed design and the implementation activities necessary for successful implementation of the SAP system in compliance with the provisions of the Contract or where not so specified, in accordance with good industry practice.

17.1.2 The Contractor shall be responsible for any discrepancies, errors or omissions in the specifications, and other technical documents that it has prepared, whether such specifications, drawings, and other documents have been approved by the Project Coordinator or not, provided that such discrepancies, errors, or omissions are not because of inaccurate information furnished in writing to the Contractor by or on behalf of the Purchaser.

17.2 Approval/Review of Technical Documents by Project Coordinator

17.2.1 The Contractor shall prepare and furnish to the Project Coordinator the documents as specified in the Technical Requirements for the Project Coordinator's approval or review.

17.2.2 Within fourteen (14) days after receipt by the Project Coordinator of any document requiring the Project Coordinator's approval in accordance with CC Clause 17.2.1, the Project Coordinator shall either return one copy of the document to the Contractor with its approval endorsed on the document or shall notify the Contractor in writing of its disapproval of the document and the reasons for disapproval and the modifications that the Project Coordinator proposes.

17.2.3 If the Project Coordinator disapproves the document, the Contractor shall modify the document and resubmit it for the Project Coordinator's approval in accordance with CC Clause 17.2.2. If the Project Coordinator approves the document subject to modification(s), the Contractor shall make the required modification(s), and the document shall then be deemed to have been approved. The procedure set out in CC Clauses 17.2.2 through 17.2.3 shall be repeated, as appropriate, until the Project Coordinator approves such documents.

17.2.4 The Project Coordinator's approval, with or without modification of the document furnished by the Contractor, shall not relieve the Contractor of any responsibility or liability imposed upon it by any provisions of the Contract except to the extent that any subsequent failure results from modifications required by the Project

Coordinator or inaccurate information furnished in writing to the Contractor by or on behalf of the Purchaser.

17.2.5 The Contractor shall not depart from any approved document unless the Contractor has first submitted to the Project Coordinator an amended document and obtained the Project Coordinator's approval of the document, pursuant to the provisions of this CC Clause 17.2. If the Project Coordinator requests any change in any already approved document and/or in any document based on such an approved document, the provisions of CC Clause 22 (Changes to the SAP System) shall apply to such request.

Guarantees and Liabilities

18 Time Guarantee & Liquidated Damages

Time is the essence of the contract. The bidder guarantees that it shall complete all activities and milestones in accordance with the time lines specified in the agreed and finalized project plan. This provision is, subject to the purchaser's fulfilment of its obligations under the contract in time. The SAP system implementation will be completed as per delivery schedule to be reckoned from the effective date of the contract. The SAP system shall be considered as completed when the purchaser has issued stabilization acceptance certificate. If the bidder fails to attain completion of project within the time frame specified in the contract or any extension in the contract, due to reasons not attributed to the purchaser, the purchaser shall recover the amount of LD, but not by way of penalty by making deduction from the bidder's account or by encashment of bidder's Bank Guarantee @ 0.5% of the total contract price plus escalations in the contract price, if any, paid or payable to the bidder per week of delay or part thereof up to the maximum of 5% of the contract price plus escalations in the contract price, if any, paid or payable to the bidder.

19 Intellectual Property Rights Indemnity

19.1 The Contractor shall indemnify and hold harmless the Purchaser and its employees and officers from and against any and all losses, liabilities, and costs (including losses, liabilities, and costs incurred in defending a claim alleging such a liability), that the Purchaser or its employees or officers may suffer as a result of any infringement or alleged infringement of any Intellectual Property Rights by reason of copying of the Software and Materials provided by the Contractor in accordance with the Agreement; and

19.2 If any proceedings are brought or any claim is made against the Purchaser arising out of the matters referred to in CC Clause 19.1, the Purchaser shall promptly give the Contractor notice of such proceedings or claims, the Contractor shall have sole control on the conduct of such proceedings or claim and any negotiations for the settlement of any such proceedings or claim and the Purchaser shall provide the Contractor with the assistance, information, and authority reasonably necessary to perform the above.

Risk Distribution

20 Transfer of Ownership

Ownership and the terms of usage of the Software and Materials supplied under the Contract shall be governed by CC Clause 13.1 (IPR).

21 Force Majeure

21.1 "Force Majeure" shall mean any event beyond the reasonable control of the Purchaser or of the Contractor, as the case may be, and which is unavoidable notwithstanding the

reasonable care of the party affected and shall include, without limitation, the following:

(a) war, hostilities, or warlike operations (whether a state of war be declared or not), invasion, act of foreign enemy, and civil war;

(b) rebellion, revolution, insurrection, mutiny, usurpation of civil or military government, conspiracy, riot, civil commotion, and terrorist acts;

(c) strike, sabotage, lockout, embargo, import restriction, industrial dispute, epidemics, quarantine, and plague;

(d) earthquake, landslide, volcanic activity, fire, flood or inundation, tidal wave, typhoon or cyclone, hurricane, storm, lightning, or other inclement weather condition, nuclear and pressure waves, or other natural or physical disaster immediately effecting project implementation;

21.2 If either party is prevented, hindered, or delayed from or in performing any of its obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances of the event of Force Majeure within fourteen (14) days after the occurrence of such event.

21.3 The party who has given such notice shall be excused from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such party's performance is prevented, hindered, or delayed. The Time for Achieving Go-Live Acceptance shall be extended in accordance with CC Clause 24 (Extension of Time for Achieving Go-Live Acceptance).

21.4 The party or parties affected by the event of Force Majeure shall use reasonable efforts to mitigate the effect of the event of Force Majeure upon its or their performance of the Contract and to fulfil its or their obligations as per CC Clause 21.6 under the Contract, but without prejudice to either party's right to terminate the Contract.

21.5 No delay or non-performance by either party to this Contract caused by the occurrence of any event of Force Majeure shall:

(a) constitute a default or breach of the Contract;

(b) (subject to CC Clauses 21.2, 21.3, and 21.4) give rise to any claim for damages or additional cost or expense occasioned by the delay or non-performance if, and to the extent that, such delay or non-performance is caused by the occurrence of an event of Force Majeure.

21.6 If the performance of the Contract is substantially prevented, hindered, or delayed for a single period of more than sixty (60) days or an aggregate period of more than one hundred and twenty (120) days on account of one or more events of Force Majeure during the time period covered by the Contract, a mutually acceptable solution would be found.

21.7 In the event of termination pursuant to CC Clause 25, the rights and obligations of the Contractor and the Purchaser shall be as specified in CC Clauses 7 and 8 respectively.

21.8 Notwithstanding CC Clause 21.5, Force Majeure shall not apply to any obligation of the Purchaser to make payments to the Contractor under this Contract.

Change in Contract Elements

22 Changes to the "SAP" System

22.1 Introducing a Change

22.1.1 The Purchaser shall have the right to propose to the Contractor from time to time during the performance of the Contract to make any change, modification, addition, or deletion to, in, or from the "SAP system" (interchangeably called "Change"), provided

that such Change falls within the general scope of the "SAP system" and does not constitute unrelated work, and is technically practicable, taking into account both the state of advancement of the "SAP system" and the technical compatibility of the Change envisaged with the nature of the "SAP" System as originally specified in the Contract.

22.1.2 The Contractor may from time to time during its performance of the Contract propose to the Purchaser (with a copy to the Project Coordinator) any Change that the Contractor considers necessary or desirable to improve the quality or efficiency of the "SAP" system. The Purchaser may at its discretion approve or reject any change proposed by the Contractor. The Contractor shall not be held responsible or liable for any resultant consequences from such rejection of any change proposed by the Contractor.

22.1.3 Notwithstanding CC Clauses 22.1.1 and 22.1.2, no change made necessary because of any default of the Contractor in the performance of its obligations under the Contract shall be deemed to be a Change, and such change shall not result in any adjustment of the Contract Price or the Time for Stabilization Acceptance.

22.1.4 The procedure on how to proceed with and execute Changes is specified in CC Clauses 22.2 and 22.3

22.2 Changes Originating from Purchaser

22.2.1 If the Purchaser proposes a Change pursuant to CC Clauses 22.1.1, it shall send to the Contractor a "Request for Change Proposal," requiring the Contractor to prepare and furnish to the Project Coordinator as soon as reasonably practicable a "Change Proposal," which shall include the following:

(a) Brief description of the Change;

(b) Impact on the Time for Achieving Stabilization Acceptance;

(a) Estimated cost of the Change;

(b) Effect on Functional Guarantees (if any);

(c) Effect on any other provisions of the Contract.

22.2.2 The pricing of any Change shall be as far as practicable, calculated in accordance with the rates included in the Contract. If the nature of the Change is such that the Contract rates are inequitable, the parties to the Contract shall agree for a mutually acceptable price for valuing the Change.

22.3 Changes Originating from Contractor

If the Contractor proposes a Change pursuant to CC Clause 22.1.2, the Contractor shall submit to the Project Coordinator a written "Application for Change Proposal," giving reasons for the proposed Change and including the information specified in CC 22.2.1. Upon receipt of the Application for Change Proposal, the parties shall follow the procedures outlined in CC Clauses 22.2.1 and 22.2, except that the words "Change Proposal" shall be read, for the purposes of this CC Clause 22.3 as "Application for Change Proposal."

23 Prices for Services not covered in the Contract

Prices charged by the Contractor for Services, if not included in the Contract, shall be agreed upon in advance by the parties (including, but not restricted to, any prices submitted by the Contractor in the Price Bid) and as far as practicable, be calculated in accordance with the rates and prices provided by the Contractor in the Price Schedule (FORM # 7) of the Bid Document.

24 Extension of Time

24.1 The time(s) for achieving Go-Live Acceptance / stabilization acceptance specified in the Schedule of Implementation shall be extended if the Contractor is delayed or impeded in the performance of any of its obligations under the Contract by reason of any of the following:

(a) Any occurrence of Force Majeure as provided in CC Clause 21 (Force Majeure);

(b) Delay in providing core team, availability of development resources and grant of acceptance for recommendation of "Gap Analysis".

(c) Any other matter specifically mentioned in the Contract; by such period as shall be fair and reasonable in all the circumstances and as shall fairly reflect the delay or impediment sustained by the Contractor.

25 Termination

25.1 Termination for Purchaser's Convenience

25.1.1 The Purchaser may at any time terminate the Contract for any reason by giving the Contractor a ninety days (90) notice of termination that refers to this CC Clause 25.1.1.

25.1.2 Upon receipt of the notice of termination under CC Clause 25.1.1, the Contractor shall either as soon as reasonably practical or upon the date specified in the notice of termination cease all further work, except for such work as the Purchaser may specify in the notice of termination for the sole purpose of protecting that part of the SAP implementation already executed, or any work required to leave the site in a clean and safe condition. In addition, the Contractor, subject to the payment specified in CC Clause 25.1.3, shall

(i) Deliver to the Purchaser the parts of the SAP System implemented by the Contractor up to the date of termination;

(ii) To the extent legally possible, assign to the Purchaser all right, title, and benefit of the Contractor to the SAP System as at the date of termination, and, as may be required by the Purchaser

(iii) Deliver to the Purchaser all non-proprietary drawings, specifications, and other documents prepared by the Contractor as of the date of termination in connection with the SAP System.

25.1.3 In the event of termination of the Contract under CC Clause 25.1.1, the Purchaser shall pay to the Contractor - The Contract Price, properly attributable to the parts of the SAP implementation executed by the Contractor as of the date of termination at the discretion of the Purchaser;

25.2 Termination for Contractor's Default

25.2.1 The Purchaser, without prejudice to any other rights or remedies it may possess, may terminate the Contract forthwith in the following circumstances by giving a notice of 15 days and its reasons therefore to the Contractor, referring to this CC Clause 25.2.1.

(a) if the Contractor becomes bankrupt or insolvent, has a receiving order issued against it, compounds with its creditors, or, if the Contractor is a corporation, a resolution is passed or order is made for its winding up (other than a voluntary liquidation for the purposes of amalgamation), a receiver is appointed over any part of its undertaking or assets, or if the Contractor takes or suffers any other analogous action in consequence of debt;

(b) if the Contractor assigns or transfers the Contract or any right or interest therein in violation of the provision of CC Clause 26 (Assignment); or

(c) if the Contractor, in the judgment of the Purchaser, has engaged in corrupt or fraudulent practices in competing for or in executing the Contract, including but

not limited to wilful misrepresentation of facts concerning ownership of Intellectual Property Rights in, or proper authorization and/or licenses from the owner to offer, the hardware, software, or materials provided under this Contract.

25.2.2 If the Contractor:

(a) has abandoned or repudiated the Contract;

(b) has without valid reason failed to commence work on the SAP implementation promptly;

(c) persistently fails to execute the Contract in accordance with the Contract or persistently neglects to carry out its obligations under the Contract without just cause;

(d) refuses or is unable to provide sufficient Materials, Services, or labour to execute and complete the SAP implementation in the manner specified in the Agreed and Finalized Project Plan furnished under CC Clause 16 at rates of progress that give reasonable assurance to the Purchaser that the Contractor can attain Go-Live Acceptance of the SAP system by the Time for Achieving stabilisation Acceptance as extended; then, the Purchaser may, without prejudice to any other rights it may possess under the Contract, give a notice to the Contractor stating the nature of the default and requiring the Contractor to remedy the same. If the Contractor fails to remedy or to take steps to remedy the same within fourteen (14) days of its receipt of such notice, then the Purchaser may terminate the Contract forthwith by giving a notice of termination to the Contractor that refers to this CC Clause 25.2.2.

25.2.3 Upon receipt of the notice of termination under CC Clauses 25.2.1 or 25.2.2., the Contractor shall, either immediately or upon such date as is specified in the notice of termination:

(a) Cease all further work, except for such work as the Purchaser may specify in the notice of termination for the sole purpose of protecting that part of the SAP System already executed or any work required to leave the site in a clean and safe condition;

(b) Deliver to the Purchaser the milestones of the SAP System implemented by the Contractor up to the date of termination, subject to the receipt of payment stated in clause 25.2.5

(c) To the extent legally possible, assign to the Purchaser all right, title and benefit of the Contractor to the SAP System as at the date of termination, Contract

(d) Deliver to the Purchaser all drawings, specifications, and other documents prepared by the Contractor as at the date of termination in connection with the SAP System.

25.2.4 The Purchaser may enter upon the site, expel the Contractor, and complete the SAP implementation itself or by employing any third party. Upon completion of the SAP implementation or at such earlier date as the Purchaser thinks appropriate, the Purchaser shall give notice to the Contractor that such Contractor's material will be returned to the Contractor at or near the site and shall return such Contractor's material to the Contractor in accordance with such notice. The Contractor shall thereafter without delay and at its cost remove or arrange removal of the Contractor's manpower/ material from the site.

25.2.5 Subject to CC Clause 25.2.6, the Contractor shall be entitled to be paid the Contract Price attributable to the portion of the SAP implemented as at the date of termination and the costs, if any, incurred in protecting the SAP and in leaving the site in a clean and safe condition pursuant to CC Clause 25.2.3 (a). Any sums due to the Purchaser

from the Contractor accruing prior to the date of termination shall be deducted from the amount to be paid to the Contractor under this Contract.

25.2.6 If the Purchaser completes the SAP implementation, the cost of completing the SAP implementation by the Purchaser shall be determined. If the sum that the Contractor is entitled to be paid, pursuant to CC Clause 25.2.5, plus the reasonable costs incurred by the Purchaser in completing the SAP exceeds the Contract Price, the Contractor shall be liable for such excess. If such excess is greater than the sums due to the Contractor under CC Clause 25.2.5, the Contractor shall pay the balance to the Purchaser, and if such excess is less than the sums due to the Contractor under CC Clause 25.2.5, the Purchaser shall pay the balance to the Contractor. The Purchaser and the Contractor shall agree, in writing, on the computation described above and the manner in which any sums shall be paid.

26 Assignment

The Contractor shall not, without the prior written consent of the Purchaser, assign to any third party the Contract or any part thereof, or any right, benefit, obligation, or interest therein or there under, except that the Contractor shall be entitled to assign either absolutely or by way of charge any money due and payable to it or that may become due and payable to it under the Contract.

27 Merger, Acquisition or Divestitures of the Contractor

In case of Merger, acquisition or divestiture of the Contractor, the acquiring company shall be bound by the terms and conditions of this contract for a period of at least 5 years from the date of completion of the project, at no additional cost to the purchaser.

Miscellaneous Clauses

28 Single currency conversion for bid evaluation

To facilitate evaluation and comparison, the purchaser will convert all bid prices expressed in the amounts in various currencies in which the bid price is payable to the local currency of the purchaser's country (Indian Rupees) based on TT selling rate published by RBI or its authorized agency, prevailing on the date of opening of the respective bids.

29 Insurance

The insurance and safety of all men and material of the Contractor at the purchaser's site shall be the responsibility of the Contractor. For this purpose the contractor shall take an insurance policy for the amount of contract price.

30 Solvency of the Contractor

Contractor should not be in the process of selling the company or filing for bankruptcy at time of signing of contract. The Contractor shall promptly intimate the purchaser as soon as he begins proceedings for selling or filing for bankruptcy.

Section V
FORMS & ANNEXURES

FORM # 1 Profile of the Bidder

(Refer Clause 8.1.3 of "Instructions to Bidders")

Implementation Partner

1. For how many years has your firm been operating in India?
2. How many of your firm's employees in India are involved in application development and SAP implementations?
3. What were your firm's revenues in the last three years? (Total and from Indian operations). Please attach audited annual accounts in support of the same
4. In which cities in India do you have support offices for post implementation support? Please indicate the support offices in India especially in and around Gurgaon giving details of certified maintenance staff, number of consultants and the structure of operation for extending support facility.
5. Quality Assurance
   i) Do you have a quality assurance accreditation /certification? (If yes please provide details about SEI-CMM / ESCM / CMMI / any other Certifications)
   ii) Are you certified by the SAP principal to implement the relevant package? If yes, please provide letter from the prime vendor.
6. Give Details of SAP projects implemented by the IP during last 5 years for user's license > 500, in format as per FORM#2 for Implementation partner (tick in box).

FORM # 2 Details of Projects Implemented

TECHNICAL BID

(Refer Clause 8.1.3 of "Instructions to Bidders")

(Use separate sheets for each Project and attach certificate from the client)

1	Name of the Project
2	Name of the Client Client Size (Approx. number of employees)
3	Client's address
4	List of modules and sub-modules Implemented
5	Number of User licences
6	Value of the Work Done (Rs in Crores)
7	Date of award
8	Date of completion

Authorised signature

Name and Designation of Signatory:

Name of Firm:

Address:

FORM # 3 Details of the Personnel to Be Deployed

Technical Bid

(Refer Clause 8.1.3 of "Instructions to Bidders")

(The personnel proposed to be deployed shall be professionally qualified from reputed universities/institutions having adequate experience in implementing SAP based system preferably in Engineering Consultancy/ project management industry.)

Sl No	Name	Designation	Qualification & whether SAP certified	Professional experience in years *	Relevant experience details #	Proposed Position	Task proposed to be Assigned
1							
2							
3							
4							
5							

* Enclose detail resumes of the personnel as per Form # 4

\# provides details of at least two most relevant project experiences (including roles and responsibilities).

Authorised signature

Name and Designation of Signatory:

Name of Firm:

Address:

FORM # 4 CV of the Team Members

Technical Bid

(Refer Clause 8.1.3 of "Instructions to Bidders")

<table>
<tr><td colspan="5">Company Name:</td></tr>
<tr><td colspan="2">Proposed Deployment Role of the Candidate</td><td colspan="3"></td></tr>
<tr><td rowspan="3">Candidate Information</td><td>Name</td><td></td><td>Date of Birth</td><td></td></tr>
<tr><td colspan="4">Professional Qualifications</td></tr>
<tr><td colspan="3">Number of Years with the present Employer</td><td></td></tr>
<tr><td colspan="5">Summarized Professional Experience in implementing relevant module (for which the candidate is proposed for RITES team) over last 5 years in reverse chronological order.</td></tr>
<tr><td>From</td><td>To</td><td colspan="3">Company/Project/Position/Relevant Technical and Management Experience</td></tr>
<tr><td></td><td></td><td colspan="3"></td></tr>
<tr><td></td><td></td><td colspan="3"></td></tr>
<tr><td></td><td></td><td colspan="3"></td></tr>
<tr><td></td><td></td><td colspan="3"></td></tr>
<tr><td></td><td></td><td colspan="3"></td></tr>
<tr><td></td><td></td><td colspan="3"></td></tr>
<tr><td></td><td></td><td colspan="3"></td></tr>
<tr><td></td><td></td><td colspan="3"></td></tr>
<tr><td></td><td></td><td colspan="3"></td></tr>
</table>

Authorised signature

Name and Designation of Signatory:

Name of Firm:

Address:

FORM # 5 Deviations /Exclusions Schedule

Blank

FORM # 6 Financial Bid Forwarding Letter

FINANCIAL BID

(Refer Clause 8.1.4 (a) of "Instructions to the ITB")

Ref:

Date:

To,

Sub: Implementation of SAP ERP system and Supply, Installation & Commissioning of IT infrastructure at RITES Ltd.

Dear Sir,

Having examined the Bidding Documents, including Addenda Nos *[insert **numbers**]*, the receipt of which is hereby acknowledged, we, the undersigned, offer to implement, commission, integrate, put into operation, Stabilise, post go live support and Extended support the ***SAP system*** under the above-named Contract in full conformity with the Bidding Documents for the sum quoted in price schedule (hereinafter called "the Total Bid Price") or such other sums as may be determined in accordance with the terms and conditions of the Contract. The break-up of the above amounts are given in the Price Schedule attached herewith and are made part of this bid.

We undertake that in case our bid is accepted, we:

(1) Shall furnish the required performance security in the form, in the amounts, and within the times specified in the Bidding Documents.

(2) Shall commence work on the SAP system and shall make all reasonable endeavours to achieve Go-live Acceptance within the respective time schedule stated in the Bidding Documents.

(3) Declare that our prices in Indian Rupees are on firm price basis for the entire project.

(4) Declare that we shall be solely responsible for arranging Import License (if any) for any materials, components and bought out items that may be required to be imported for the purpose of performing the work under this proposal and accordingly our bid price include all the customs & import duties and levies including license fees etc. payable by us and you shall not be liable in this regard whatsoever. We further confirm that any increase or decrease in the custom duty shall be borne by us.

We agree to abide by this bid, which, in accordance with ITB Clause 8 (Documents comprising the bid) consists of this letter, the Price Schedule, the Bid Security, letter of authorization, documents establishing conformity, list of deviations, CVs of the personnel to be deployed on this Contract (Form# 4) and Attachments 1 through *[specify: **the number of attachments**]* to this Bid Form, for a period of 180 days from the date fixed for submission of bids as stipulated in the Bidding Documents, and it shall remain binding upon us and may be accepted by you at any time before the expiration of that period.

We declare that the total amount quoted (and prices quoted for each component, the break-up of which is given in the Price Schedule) are firm and shall not be subject to any variation for the entire period of the assignment. We further declare that the quoted prices include all taxes as on the date of bid submission, duties and levies payable by us under aforesaid assignment.

We have given details of deviations and exclusions (clause wise) taken with reference to bidding documents provisions, along with justification for the services not covered in our offer.

Until the formal final Contract is prepared and executed between us, this bid, together with your written acceptance of the bid and your notification of award, shall constitute a binding contract between us. We understand that you are not bound to accept the lowest or any bid you may receive.

Dated this *[insert: **number**]* day of *[insert: **month**], [insert: **year**]*.

Signature.....

Name .....

Designation and Common Seal.....

In the capacity of [ ]

Duly authorized to sign this bid for and on behalf of [insert: name of Bidder]

FORM # 7 Price Schedule

FINANCIAL BID

(Refer Clause 8.1.4 (b) of "Instructions to Bidders")

Ref:

Date:

Bidder's Name and Address

Telephone No. / FAX No./ E-Mail

To,

Dear Sir,

Sub: Implementation of SAP ERP system and Supply, Installation & Commissioning of IT infrastructure at RITES Ltd.

In continuation of our Financial Bid (FORM # 6) for the above mentioned business solution offered, the following is the total lump sum price (Total Bid Price) for the scope of services

i) In figures _____

ii) In words _____

(Total as in Table A)

We give below the break up of the lump sum price for the **Implementation of SAP ERP system and Supply, Installation & Commissioning of IT infrastructure at RITES Ltd.**

Table A (Please Quote in Indian Rupees only)

Sl No	Price Break-Up for Main Components	Qty	Unit Rate (Rs)	Domain		Base Price	Sales Tax	Service Tax	Other Taxes / Duties	Total Amount (Rs)
				Product OEM	Implementation Partner					
(1)	SAP Implementation Service including Configuration, Bespoke development, Training, Legacy Integration charge and stabilization support charge									
(2)	Quality Review and Audit Charge by the ERP OEM (SAP)									

Sl No	Price Break-Up for Main Components	Qty	Unit Rate (Rs)	Domain		Base Price	Sales Tax	Service Tax	Other Taxes / Duties	Total Amount (Rs)
				Product OEM	Implementation Partner					
(3)	Charges for the Roll-Out to all the remaining locations of RITES									
(4)	Extended Support Charge for 1 year									
(5)	Charges for the Supply of Servers and associated softwares & peripherals with 3 years of warranty									
(6)	Charges for the Data Centre including charges for the hardware components of the Data centre and the Civil & Electrical Works with 3 years of warranty									
Total Bid Price										

Therefore, Total Cost of Owner ship (TCO) = (1) + (2) + (3) + (4) + (5) + (6) =

***** The Charges for the Roll-Out to all the remaining locations of RITES shall remain valid till 3 years from the date of submission of this bid.

Dated this *[insert: **number**]* day of *[insert: **month**]*, *[insert: **year**]*.

Signature.....

Name .....

Designation and Common Seal.....

In the capacity of [ ]

Duly authorized to sign this bid for and on behalf of [insert: name of Bidder]

Directions for filling up the Price schedule:

- Please indicate the price both in figures as well as in words. In case price is for unlimited number of users, please mention the same.

FORM # 8 Contract Agreement

(Refer Clause 24.2 of "Instructions to Bidders")

This Agreement is made at Gurgaon on the _____ day of _____ 2011_____ Between RITES, Gurgaon – 122001, Haryana hereinafter called "the Purchaser" of the one part and _____ (Name of IP) (Address of IP) _____ of _____ hereinafter called "the IP" of the other part.

Whereas the Purchaser is desirous that certain Works should be executed, viz implementation, integration, Stabilization and extended support of SAP based Enterprise Business Solution (system) in RITES (as described on these bidding documents) hereinafter called "the Works" and has accepted a bid by the IP for the execution and completion of such works (*** as well as guarantee of such works) and the remedying of defects therein. NOW THIS AGREEMENT WITNESSETH as follows:

1. In this Agreement words and expression shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
2. The following documents shall be deemed to form and be read / construed as part of this Agreement, viz:
   (a) Letter of Acceptance
   (b) Addenda, if any
   (c) Conditions of Contract as per RITES Tender document
   (d) Scope of the Work and Technical Requirements
   (e) Bid proposal (Financial)
   (f) Any other item as applicable +
3. In consideration of the payments to be made by the Purchaser to the IP as hereinafter mentioned, the IP hereby covenants with the Purchaser to execute and complete the works by **_____ and remedy any defects therein in conformity in all respects with the provisions of the Contract.
4. The Purchaser hereby covenants to pay the IP in consideration of the execution and completion of the works and the remedying of defects therein, the Contract Price of **Rs_____ being the sum stated in the letter of acceptance subject to such additions thereto or deductions there from as may be made under the provisions of the Contract at the times and in the manner prescribed by the Contract.
5. Jurisdiction of Court: The Courts at_____ shall have the exclusive jurisdiction to try all disputes arising out this agreement between the parties.

IN WITNESS WHEREOF the parties hereto have caused their respective Common Seals to be hereunto affixed / (or have hereunto set their respective hands and seals) the day and year first above written.

For and on behalf of the IP	For and on behalf of the Purchaser
Signature of the authorized official	Signature of the authorized official
Name of the official	Name of the official
Stamp/Seal of the IP	Stamp/Seal of the Purchaser

SIGNED, SEALED AND DELIVERED

By the said _____

Name on behalf of the IP in the presence of:

Witness _____

Name _____

Address_____

_____

_____

By the said

_____

Name on behalf of the Purchaser in the presence of:

Witness _____

Name _____

Address_____

_____

_____

Note:

\+ To be made out by the Purchaser at the time of finalization of the Form of Agreement.

** Blanks to be filled by the Purchaser at the time of finalization of the Form of Agreement.

*** To be deleted if not applicable

FORM # 9 Form of Bank Guarantees (Performance Security)

1. PERFORMANCE SECURITY (GUARANTEE) BY BANK

(Refer Clause 25 of "Instructions to Bidders")

To,

In consideration of RITES Ltd, Gurgaon – 122001 acting through --------

(hereinafter referred to as RITES Ltd. which expression shall include his successor and assignees) having awarded to ---------- (hereinafter referred to as "the IP" which expression , wherever the subject or context permits, includes its successors and assignees) a contract for implementation and integration of SAP system in RITES Ltd in terms of inter-alia RITES Ltd's letter No.----Date---- (hereinafter called "the Contract.") and general Conditions of Contract and upon the condition of the IP's furnishing Security for the IP's liability under and in connection with the said contract up to a sum of Rs.-------- amounting to 10% of the total contract value.

1. We _____ (hereinafter referred to as the Bank or the said bank) and having our registered office at _____ do hereby jointly and severally undertake to guarantee the payment to RITES in rupees forthwith on demand in writing and without protest or demur any or all moneys any wise payable by the IP to RITES Ltd in respect of or in connection with the said contract inclusive of all RITES Ltd's losses and damages and costs. (inclusive between attorney and client) Charges, and expenses and other moneys anywise payable in respect of the above as specified in the notice of demand made by RITES Ltd to the Bank with reference to this guarantee up to an aggregate limit of Rs……
2. We _____ further agree that RITES Ltd shall be the sole judge of and as to whether the said IP has committed any breach or breaches of any of the terms and conditions of the said contract and the extent of loss, damages, charges and expenses caused to or suffered by or that may be caused to or suffered by RITES Ltd on account thereof and the decision of RITES Ltd that the IP has committed such breach or breaches and as to the amount or amounts of loss, damage, costs, charges and expenses caused to or suffered by RITES Ltd from time to time shall be final and binding on us.
3. RITES Ltd shall have the fullest liberty without reference to the bank and without effecting in any way the liability of the said Bank under this guarantee to take any other security in respect of the IP's obligation and liabilities hereunder or to vary the contract/ work to be done there under vis-à-vis the consultant or to

   vary the prices of the total contract value or to release or forbear from enforcement of all or any other security or any other securities now or anytime held by RITES Ltd and such arrangements with the IP or release or forbearance whatsoever shall absolve the bank of the full liability to RITES Ltd hereunder or prejudice the rights of RITES Ltd against the bank.
4. The guarantee shall not be determined or affected by the liquidation or winding up of, dissolution or change in constitution or insolvency of the IP but shall in all respect and for all purposes be binding and operative until payment of all moneys payable to RITES Ltd in terms thereof.
5. The bank hereby waives all rights at any time inconsistent with the terms of this guarantee and the obligations of the bank in terms hereof shall not be in anywise affected or suspended by reasons of any dispute or disputes having been raised by the IP (whether or not pending before any arbitrator, Tribunal or court) or purporting to stop or prevent any payment by the bank to RITES Ltd in terms thereof.

6. The amount stated in any notice of demand addressed by RITES Ltd to the bank as liable to be paid to RITES Ltd by the IP or as suffered or incurred by RITES Ltd on account of any losses, damages, costs, charges and expenses shall be conclusive evidence of the amount so liable to be paid to RITES Ltd or suffered or incurred by RITES Ltd as the case may be and in terms hereof.
7. This guarantee / undertaking shall be in a continuing guarantee / undertaking and shall remain valid and irrevocable for all claims of RITES Ltd and liabilities of the IP arising up to and until midnight of…….
8. This guarantee/ undertaking shall be in addition to any other guarantee or security whatsoever that RITES Ltd may now or any time anywise may have in relation to the IP's obligations or liabilities under and/or in connection with the said contract, and RITES Ltd shall have full authority to have recourse to or enforce this security in preference to any other guarantee or security which RITES Ltd may have or obtain and not forbearance on the part of RITES Ltd in enforcing or requiring enforcement of any other security shall have the effect of releasing the bank from its full liability hereunder.
9. It shall not be necessary for RITES Ltd to proceed against the said IP before proceeding against the Bank and the guarantee herein contained shall be enforceable against the bank notwithstanding that any security which RITES Ltd may have obtained or obtain from the IP shall at the time when proceedings are taken against the said bank hereunder be outstanding or unreleased.
10. We the said bank undertake not to revoke this guarantee during this currency except with the consent of RITES Ltd in writing and agree that any change in the constitution or the said IP or the said bank shall not discharge our liability hereunder.
11. Notwithstanding anything contained herein above, our liability under this guarantee shall be restricted to Rs……and this guarantee shall remain in full force till…….. And unless a claim is made on us within ……. Months from the date i.e. before…… all the claims under this guarantee shall be forfeited and we shall be relieved of and discharged from our liabilities hereunder.

Dated……. Day of …….. 2011

Name of Bank: ----------

Address : ----------

Date: ----------

FORM # 10 Confirmation from SAP with regard to their role in SAP implementation at RITES Ltd

{To be given on ERP OEM (SAP)'s letter head}

This is to confirm that on selection of M/s …….. which is a certified Implementation Partner of SAP for the SAP ERP implementation at RITES Ltd, SAP will comply and take full responsibility to the full satisfaction of RITES Ltd. with regard to the following:

1. ----------
2. ----------
3. ----------

{List all the points as indicated under the heading Quality Review and Audit by the ERP OEM (SAP)}

For and on behalf of SAP

(Signature)

Name
Designation
Official seal
(To be signed by authorized personnel of SAP)

FORM # 11 Litigation History

(Refer Clause 8.1.3 c) of "Instructions to Bidders")

Litigation History

The bidder should provide detailed information on any litigation or arbitration arising out of contracts completed or under execution by it over the last five years. A consistent history of awards involving litigation against the Bidder or any partner of JV may result in rejection of Bid. [Reference ITB clause 8.1.3 (c)]

Details of litigation history resulting from Contracts completed or under execution by the bidder over the last five years:

Year	**Name of client, cause of litigation/arbitration and matter in dispute**	**Details of Contract and date**	**Award for or against the bidder**	**Disputed amount**

Signature.....

Name .....

Designation and Common Seal.....

In the capacity of [ ]

Duly authorized to sign this bid for and on behalf of [insert: name of Bidder]

Annexure-I Technical Evaluation Matrix for the selection of Implementation Partner (IP)

Sl. No	Characteristics	Question	Marks	Response of the Bidder	Evaluation Criteria
I	**Credentials of the Implementation Partner (IP)**				
1	Experience of Implementation for SAP ERP project in India	No of SAP ERP Project implementations in India in last five years from the date of submission of bid.	15		3 projects or above = 15 2 projects = 10 1 project = 5 No projects = 0
2	Experience of Implementation in PSU / Govt. Sector in India	No of SAP ERP Projects implemented in a PSU / Govt. Sector in India where the role of the bidder must have been either as an Implementation Partner or Program Management Consultant in India.	10		1 project or above = 10 No projects = 0
3	Experience of Implementation in EPC sector in India	No of SAP ERP Projects implemented in Engineering, Procurement & Construction (EPC) Sector in India as a Prime Implementation Partner	10		1 project or above = 10 No projects = 0
4	Project Capabilities	No of SAP ERP Project implementations in India as a Prime Implementation Partner of value not less than Indian Rupees 3 Crores for similar scope of work as this tender during the last three years as on the date of submission of bid	10		1 project or above = 10 No project = 0

Sl. No	Characteristics	Question	Marks	Response of the Bidder	Evaluation Criteria
5	Functional Experience	No of SAP ERP project implementations where at least 3 out of following 4 functional areas are implemented in the same project in India: • Project Management • Finance, Accounting and Controlling • Human Resource Management • Purchasing, Contracts and Materials Management	10		2 projects or above = 10 1 project = 5 No project = 0
6	Quality of proposed Project Manager	No of End-to-end SAP project implementation experience of the Project Manager proposed for the RITES project	10		2 projects or above = 10 1 project = 5 No project = 0
7	Quality of proposed project team	No of SAP Functional Consultants proposed for the RITES project, from each of the following functions: • Project Management • Finance, Accounting and Controlling • Human Resource Management • Purchasing, Contracts and Materials Management	10		For each module, if IP proposes: 2 or more persons, each person having atleast one End-to-end SAP implementation experience = 2.5 1 person for each module having atleast one End-to-end SAP implementation experience = 1.25 So, total marks for 4 modules = 2.5 * 4 = 10
II	**Presentation on Approach & Methodology**				
	Presentation by the IP	Presentation by the IP on the Critical Business Processes of RITES & their Approach & Methodology for the project	25		Presentation will be evaluated by a Evaluation Committee as give in ITB clause 19 a (iii)

Note:

Documentary evidence:
SAP ERP projects implemented/ mentioned by the IP's shall be considered completed/implemented after Pilot Go Live of the project. The bidder has to furnish Client's Go-Live Certificate/documentary evidence in this regard.

and

Definition of SAP ERP project is as given below:
The SAP ERP Projects implemented by the IP should cover at least three out of the following functional areas with at least 100 ERP named user licenses:

- Financial Accounting & Controlling
- Project Management
- HR/ Payroll
- Asset Management /Maintenance Management
- Materials Management
- Quality Management
- Sales & Distribution

Annexure-II Specifications for the hardware for Data Centre

SAP SIZING TABLE:

RITES SAP Implementation Server Sizing

		Required / recommended Configuration						
		Base SAPS	**Additional Loading for customization**	**Net Recommended SAPS**	**RAM (GB)**	**Boot Disk (GB) - OS & SWAP in RAID 1**	**SAN Disk (GB) (RAID 1 for Prod and RAID 5 for Dev/QA/ Backup/Snapshot)**	**Remarks**
Development Systems								
ERP Development System		2000	0%	2000	16	146	300	
Portal ,BI, and PI Development system		4000	0%	4000	24	146	300	
DMS Development system				1 x 2.0Ghz CPU	8	146	300	Windows based x86 server
Quality Servers								
ERP QA System		2000	0%	2000	16	146	300	
Portal ,BI, and PI QA system		4000	0%	4000	32	146	300	
DMS QA system				1 x 2.0Ghz CPU	8	146	300	Windows based x86 server
Production Servers								
ERP Production System		**8000**						
Database Load	30%	2400	65%	3960	32	146	700	HA Cluster
Central Instance (SCS) + DB Failover	30%	2400	65%	3960	32	146		
Application Load	70%	5600	60%	8960	64	146		App server must be load balanced across minimum two OS instances using virtualization
BI & BOBJ Production		**4000**						

		Required / recommended Configuration						
		Base SAPS	**Additional Loading for customization**	**Net Recommended SAPS**	**RAM (GB)**	**Boot Disk (GB) - OS & SWAP in RAID 1**	**SAN Disk (GB) (RAID 1 for Prod and RAID 5 for Dev/QA/ Backup/Snapshot)**	**Remarks**
System								
Database and SCS Load	100%	4000	50%	6000	32	146	500	HA Cluster for full perf failover
Application Load	100%	4000	50%	6000	32	146		
ESS Portal & PI Production System		**7500**						
Database Load	30%	2250	70%	3825	32	146	500	HA Cluster
CI (SCS) + DB Failover	30%	2250	70%	3825	32	146		
Application Load	70%	5250	50%	7875	64	146		App server must be load balanced across minimum two OS instances using virtualization
Solution manager		4000	0%	4000	32	146	500	
DMS Production Server 1				2 x 2.0Ghz QC CPU	32	146	500	x86 server with Windows ent ed OS and Failover Cluster with server 2
DMS Production Server 2				2 x 2.0Ghz QC CPU	32	146		x86 server with Windows ent ed OS and Failover Cluster with server 1
Backup Server				2 CPU	32	146		CPU specification must be same as that used in production

1. Server Hardware Requirements for all applications

These specifications are minimum and bidder shall provide the additional hardware(s) and software(s), if required, by their solution to meet the RFP and SLA requirements. The Quoted servers and its Operating Systems Software should be certified by M/S SAP for supporting the current version of SAP ERP and meeting SAP sizing as given in the table above. Vendor need to submit the supporting document in the technical bid. ***No virtualization will be allowed in the Production server. The OS for the Production server shall be UNIX and the OS for the other servers may be UNIX/ LINUX/ Windows.***

In case of any SLA breaches related to hardware performance, bidder shall provide the additional hardware at no extra cost to RITES. Following are the minimum requirement of blade servers:

- For Production servers, these shall be 64 bit RISC/EPIC with clock speed of 1.6 GHz or above with industry standard 64 bit UNIX Operating System
- For non-production servers, these shall be 64 bit RISC/EPIC with clock speed of 1.6 GHz or above with RISC/ EPIC/x86
- Exact number of CPUs in all servers to be defined by the bidder based on the information provided in Table 1. Appropriate supporting documents such as published benchmark/lab certification etc. shall be provided along with detailed sizing report.
- The blade server should be configured with minimum dual redundant 300 GB or higher, 10K rpm, SAS/SCSI/FC Hot pluggable hard drives in mirror mode
- The blade server shall have redundant fan/blowers and redundant hot swappable power supplies via blade enclosure
- The blade server shall be configured with minimum dual redundant 8 Gbps FC Ports and 4 numbers of 1Gbps or 10Gbps ethernet ports for public LAN and heartbeat.
- The average CPU utilization of the environment must not go beyond 65%
- For production servers, OS should be UNIX version complied for 64-Bit Architecture, with unlimited Systems user license and UNIX/Linux/ Windows for non-production servers.
- OS should support IP V6
- OS shall permit activation of additional processors, if populated, without requiring a reboot.
- Journaling file system and a volume manager shall be provided with each server as to meet the RFP requirements.
- OS shall support online version upgrades and shall have ability to apply the patches online. Support Virtual IP Address to help applications remain available if network adapter connection is lost.
- If servers are virtualized, bidder shall provide Virtualization Software License for full capacity of the server, allowing for hosting multiple Virtual Machines (VMs) as well as virtual / Logical Partitions on the Server. No virtualization will be allowed in the Production server. The virtualization software should allow for migration of VMs from one physical server to another physical server without requiring a reboot or shutdown of the VMs. The bidder shall provide Clustering software with appropriate licenses. Please refer clustering software details **Table 3** for more details
- The bidder should provide official Roadmap of at least next two generations of CPUs of the quoted servers.
- The Blade Enclosure shall support full height blades in same chassis.
- One DVDROM Drive per chassis.
- Minimum 2 Console Ports Remote /local per chassis

Table 1: Blade Chassis specifications

Sl. No	Features	Minimum Specifications
1	Midplane	Should support a passive/active dual path/redundant midplane architecture

2	Blade Bays	Blade Chassis to accommodate minimum of 8 Full Height /16 Half Height Hot Plug-gable Blade Servers with Dual I/O Connectors as well as Power Connectors for Redundancy.
3	Ethernet Switch Modules	2 No.s 10G Ethernet Switching Modules to be provided in redundant configuration for Connecting to all the blade servers to external Switch. Configuration should help minimize the Ethernet Cables and 2 nos of 10/100/1000 Mbps Ethernet switch with minimum 4 uplink ports.
4	I/O Path for all Fabrics	Chassis should have dual I/O connections from every blade server to help provide maximum uptime
6	Fibre Channel Switch Module	The Blade Channel SAN Switches. Each SAN Switch should be minimum 20 Port capable, providing connectivity to each blade server slot and providing at least 4Gbps Uplink ports for connectivity to External Storage
7	Management Modules	Hot swappable management module to communicate with the system management processor on the Blade Servers from remote locations.
8	Total No. of Switch/Bridge Module Slots	Chassis should support all modules ethernet(1g/10g), infiniband, FC ports in load balancing and failover mode. These cards should be on separate PCI based slots in blades.
9	Fan/Blower Modules	Should have Redundant and hot swappable blower or fan Modules
10	Power Modules	Dual Power Supply to cater power for the blade servers (redundant). No single point of failure for Power Delivery. No single fault should take down the entire power bus. Should have N+N power topologies for higher uptime.
11	Redundancy in Power Modules	Chassis should have redundant fans on the power supplies and should be able to provide reconfiguration of fans and power supplies without manual intervention
12	CD/Diskette/USB	CD-ROM/DVD-ROM Drive which can be shared among all the blade servers.
13	Failure Support	Failure warning Support for Blades, bridge/switch modules, I/O modules, management modules, power modules, blower modules, media tray
16	System Management	Should support diagnostic features for Blade server, processor, memory, power supplies, blowers, switch module, management module
17	System Panel	Colour LED/LCD panel to provide power-on, location, over temperature, information and system error conditions
18	Support for heterogeneous Servers	The chassis should be able to support Blade Servers RISC/EPIC/CISC/X-86 (Intel) architecture processors

Table 2 Blade Server Requirements

S. No.	Application	No. of Blades	RAM /Blade	Remarks
	Development System			
1	ERP QA System	_	32 GB	
2	Portal, BI and PI QA system	_	32 GB	
	Quality Servers	_		
3	ERP QA System	_	32 GB	
4	Portal ,BI, and PI QA system	_	32 GB	
	Productions Servers - ERP			
5	Database Load & Central Instance (SCS) + DB Failover	1	128 GB	In HA Mode for DB servers and Load Balancing mode for Application servers
6	Application Load	1	128 GB	In Load Balance Mode
	Productions Servers – BI & BOBJ			
7	Database Load & Central Instance (SCS) + DB Failover	1	64 GB	In HA Mode Standalone
	Productions Servers – ESS Portal & PI Production System			
8	Database Load & Central Instance (SCS) + DB Failover	1	64 GB	In HA Mode
9	Application Load	1	128 GB	In Load Balance Mode
	Other Servers			
10	Solution Manager	_	64 GB	
11	Backup Server	_	64 GB	
12	DMS Development System	_	32 GB	
13	DMS QA System	_	32 GB	
14	DMS Production 1	1	64 GB	x86 server with Windows ent ed OS and Failover Cluster with server 2
15	DMS Production 2	1	64 GB	x86 server with Windows ent ed OS and Failover Cluster with server 1

2 Clustering Solution

The table below provides the minimum specifications for the proposed clustering solution:

Table 3: Clustering solution

S. No.	Basic Requirement
1	The components specified in cluster shall be in high availability cluster
2	The cluster solution must be able to provide fail-over to the other system for any failure arising in one of the system due to: • Hardware • Operating System • Oracle Database • SAP process in any of the two systems • Server failure • Partition Failure • Any other failure which causes the server/partition to fail. The failover must be carried out using pre-built and SAP certified monitoring and failover agents and MUST not use manual scripting on deployment site. Vendor to provide complete technical details on the failover agents in the technical bid.
3	Dedicated partition on separate physical server for DB failover is mandatory.
4	The High Availability cluster shall be with adequate redundancy and with equal performance and configuration, and will have access to the same database and storage.
5	There shall be independent, redundant heartbeat for each cluster.
6	The solution shall provide for all the necessary hardware and software components, licenses required for high availability and clustering.
7	No committed transactions in SAP should be lost in case of failure of clustered component.
8	Once the failed system comes up there should revert back to the original configuration automatically. Option for reverting back manually should also be available
9	The offered cluster solution should be certified for SAP WAS 7.0 (Unicode) suite by SAP.
10	The proposed solution of implementing the fail-over must be explained in detail in the technical proposal along with logical diagrams. The documentation should identify the failure scenarios (for ex. Failure of a partition, failure of a server with multiple partitions, failure of SAN switches, failure of storage, failure of entire site) and detail the expected behaviour, interruptions if any to the end user etc. for both failover and fail back. The purchaser reserves the right to include one or more of these scenarios as part of the acceptance test.
11	Necessary software for automatic cluster failover to be supplied. It should be seamless failover without manual intervention. The users should be transparent to this switching

	and needn't do fresh login.

3 SAN (Storage Area Network) Solution

SAN should have the following minimum specification however bidder shall propose solution based on the RFP requirement

S. No.	Parameter	Functionality
1	Operating System & Clustering Support	1. The storage array should support industry-leading Operating System platforms including: Windows Server 2003, 2008, Vmware, Sun Solaris, HP-UX, IBM-AIX and Linux. 2. Offered Storage Shall support all above operating systems in Clustering.
2	Capacity & Scalability	1. The Storage Array shall be offered with usable capacity of 10 TB in RAID 5 & 5 TB RAID 1+0 using 450 GB 15K FC drives. Also additional5 TB RAID 5 usable capacity using 1 TB or 2 TB SATA/FATA drives should be provided. 2. Storage shall be scalable to minimum of 200 number of drives supporting FC, and SATA drives
3	Processing Power	Offered controllers shall be based on latest PCI-e technology to ensure that there is no bottleneck for IO communication.
4	Architecture	Storage Array shall have Switched Architecture for Disk drive connectivity.
5	No Single point of Failure	Offered Storage Array shall be configurable in a No Single Point of configuration including Array Controller card, Cache memory, FAN, Power supply etc.
6	Disk Drive Support	Offered Storage Array shall support 4Gbps dual-ported 300 / 400 / 450GB / 600GB hot-pluggable Enterprise FC hard drives. Should also support minimum of 73GB SSD Drives along with SATA/FATA (1TB or 2TB) drives in the same device shelf if required.
7	Cache	1. Offered Storage Array shall be given with Minimum of 8GB cache 2. Cache shall be dynamically managed for Read and Write operations.
8	Raid Support	1. Offered Storage Subsystem shall support Raid 0, 1, 1+0 and Raid 5/6. 2. Storage subsystem shall support expansion of both Disk group and raid group dynamically at both storage and Host level as per defined policies.
9	Host Ports & Back-end Ports	Offered Storage shall have minimum of 8 host ports for connectivity to servers & minimum of 8 device ports for Disk shelf connectivity

10	Ports Bandwidth	Offered storage shall be end to end 4Gbps where each drive and drive shelf shall be connected through dual active-active paths.
11	Global Hot Spare	1. Offered Storage Array shall support distributed Global hot Spare for offered Disk drives. 2. At least 2 Global hot spare drive shall be configured for every 50 drives.
12	Performance	1. Shall have capability to use minimum 30 drives per array group or raid group for better performance.
13	Load Balancing & Multi-path	Multi-path and load balancing software shall be provided, if vendor does not support MPIO functionality of Operating system.
14	Maintenance	Offered storage shall support online non-disruptive firmware upgrade for both Controller and disk drives.
15	Copy Services and Software	1. Shall support Snapshot Full physical copy (Clone). 2. Shall support more than 4 full copies per volume of a given production volume. 3. Shall be able to create copy on different raid set as compared to Production volume. 4. Shall be able to create Clone operation on low performance SATA / FATA drives as well.
16	Storage Array Configuration & Management Software	1. Vendor shall provide Storage Array configuration and Management software. 2. Software shall be able to manage more than one array of same family.
17	Performance Management	Vendor shall also offer the performance management software for Storage Array.
18	Remote Replication	1. Storage shall support both Synchronous and Asynchronous replication at controller level. 2. Shall support continuous replication to Remote location without using any buffering technology inside cache at Primary location for better Recovery Point Objective. 3. Shall support replication across all models of the offered family.

19	Storage Management Software	The bidder shall propose the necessary storage management software for monitoring and administration of storage solution. The storage solution should have storage management utilities that help in administering the storage. A single storage management console should be provided for all storage management related activities.

4 SAN Switches

S.No.	Functionality
1	Minimum Dual SAN switches shall be configured where each SAN switch shall be configured with minimum of 24 active Ports. Each san switch should be scalable up to 40 ports
2	Required scalability shall not be achieved by cascading the number of switches and shall be offered within the common chassis only
3	Should deliver 8 Gbit/Sec Non-blocking architecture with 1:1 performance for up to 40 ports in a energy-efficient fashion
4	Should protect existing device investments with auto-sensing 1, 2, 4, and 8 Gbit/sec capabilities.
5	The switch shall support different port types for connecting to hosts, storage and other SAN switches
6	The switch should be rack mountable
7	Should support Non disruptive Microcode/ firmware Upgrades
8	The switch shall provide Aggregate bidirectional bandwidth of 680 Gbit/sec: 40 ports × 8 Gbit/sec (data rate) end to end.
9	Switch shall have support for web based management and should also support CLI.
10	The switch should be configured with required licenses
11	Offered SAN switches shall be highly efficient in power consumption.
12	Switch shall support POST and online/offline diagnostics

5 Tape Library

Enterprise class tape library backup system to be provided to back up the entire SAN at DC. In view of the data size, backup policy (daily, weekly, monthly and annual backup sets), RITES's SAP system requires Enterprise Class Tape Library with very high scalability of slots.

S. No.	Parameter	Functionality
1	Capacity	1. Shall support Native data capacity of 72TB (uncompressed) expandable to 144TB (2:1 compressed). 2. Shall be offered with Minimum of two LTO5 FC tape drive. Drive shall support encryption 3. Shall be offered with 48 media slots.
2	Tape Drive Architecture	Offered LTO5 drive in the Library shall conform to the Continuous and Data rate matching technique for higher reliability.
3	Speed	Offered LTO5 drive shall support 140MB/sec in Native mode and 280MB/sec in 2:1 Compressed mode.
4	Scalability	Tape Library shall be further scalable to 4 LTO-5 drives within the same frame or by cascading another frame
5	Connectivity	Offered Tape Library shall provide 8Gbps native FC connectivity to SAN switches.
6	Encryption device	Offered Library shall be provided with a hardware device like USB key, separate appliance etc. to keep all the encrypted keys.
7	Management	Tape Library shall provide web based remote management.
8	Other Features	1. Tape Library shall have GUI Panel 2. Shall be rack mountable. 3. Shall have option for redundant power supply 4. Tape Library shall be supplied with software which can predict failures through early warning and shall also suggest the recommended service action. 5. Offered Software shall also have the capability to determine when to retire the tape cartridges and what compression ratio is being achieved

6 Backup Solution

Bidder shall propose backup solution with adequate no. of licenses and back up agents(open file, online etc) for full production capacity of the proposed hardware.

- The proposed backup solution should be provided with SAN based backup / restore from various proposed platforms including UNIX, Linux and Windows.
- The proposed backup solution shall support industry leading cluster solution such as MSCS, VERITAS, AIX, HPUX and Solaris as its backup clients
- The proposed backup solution shall be configured with required client and media licenses for both SAN based backup and LAN based backup for all the proposed servers. The proposed backup solution must not require separate licensing when upgrading from a lower end server (1-2 CPU-based server) to higher end server (4-and CPU-based server)

- The proposed backup solution has certified “hot-online” backup solution for different type of databases such as Oracle, MS SQL, Sybase etc.
- The proposed backup solution must be able to rebuild the backup database/catalog from tapes in the event of catalog loss/corruption.
- The proposed backup software must be provided with online agents for all the production servers including ERP, Messaging, Mgmt and other such servers that are active part of Production Landscape.

7 Network and Security Specifications

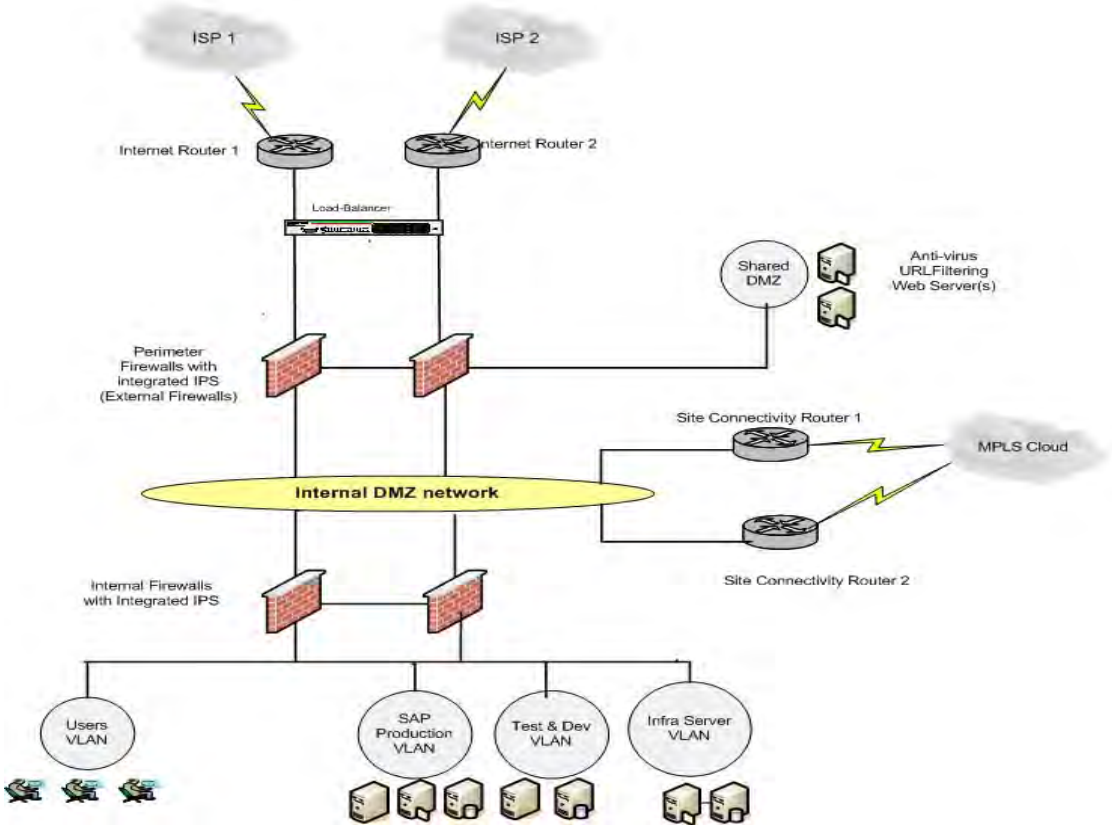
7.1 Proposed Network Design and e-Security Infrastructure blueprint

RITES requires a secure and reliable network architecture which is aligned to the technology requirements of the organization. This architecture is based on industry best practices and should have characteristics including:

- Availability
- Security

Availability: The architecture provides for availability by enabling a redundant network design. Redundant devices and links in each layer of the architecture provides for multiple paths through the core Data Centre network.
Security: The architecture provides for network security comprising of firewalls, IDS/IPS etc. Network security would have multiple, built-in layers of security. It will offer comprehensive and integrated protection from worms, spam, malicious attacks, disasters and wide range of threats and attacks from both inside and outside the network.

Suggestive Security Infrastructure Blueprint for RITES



8 WAN Connectivity

From WAN connectivity architecture perspective, an MPLS Service Provider would be engaged to provide MPLS connectivity between the Data Centre and all the site locations.

9 Internet Connectivity

The Internet connectivity will be Multi-homing with two different Internet service providers. One of the connectivity will be used for outgoing user surfing traffic. The second connection will be used as a failover. The design should allow failover and redundancy. All Internet traffic will be firewalled and suitable policies will be enforced.

10 Firewalling

The applications will be hosted in multi-tiered model of web server, applications, database etc. The security tiering is achieved using the separate firewalls and resiliency is achieved using load balancers. The Firewalls and Load balancers which are VLAN aware enforce the segregation between the server farms. The firewalling is done for both the internet traffic as

well as the WAN traffic. The Firewalls will be logically partitioned for achieving any further security zones.

Necessary system should be built for centralized management of the firewalls. Pushing the firewall rules, backup of policies, firewall logs should be managed from the centralized console. A centralized system is envisaged for managing the other security devices like VPN appliances, IPS Firewall, Router, Switch and create log of all security alerts that can be used for generating report and analyzing threats in user defined time span.

11 IPS / IDS

Bidder may propose a Firewall Integrated or Independent / External IPS solution. Proposed IPS solution shall be a Network based Intrusion prevention systems that identifies, classifies and stops known threats. They should protect against attacks including directed attacks, Worms, Botnets, Malware, Application abuse. IPS systems will be deployed inline at the WAN and Internet entry points to data centre.

12 VPN and Encryption

The data traffic from the various Offices flowing on the WAN as well as through the Internet will be encrypted. The encryption will be SSL or IPSec based. The WAN based data traffic will be encrypted with IPSec and the Internet browser based access will be encrypted with SSL/IPSec. On the WAN links, the IPSec encryption will be with hardware based modules inbuilt into the routers and for the low end routers this will be software based. Dedicated SSL VPN appliance should be provisioned for SSL VPN.

13 DNS, DHCP, Proxy Services

The DNS service is to be built in the DMZ area which will sync up as per the requirements with the service providers DNS and downstream to the other Internal DNS systems.

14 Data Center Switches

The design adopted for the Data center switching is a layered approach consisting of the collapsed Core and distribution and an access layer.

15 Core/ Distribution Switch

The design adopted here is a collapsed layer having the functionality of both Core and aggregation layer. This layer provides the high speed packet switching backplane for all the data flows in and out of the data center.

16 Access Switches

This is the Access layer which has layer 2 redundant connectivity to the Core/Aggregation layer. The access layer switch aggregates the server traffic towards the aggregation layer through redundant 10 Gigabit channel.

17 Network Authentication

The access to the Network devices will be controlled over TACACS+ or RADIUS authentication. Necessary system with the software is to be deployed for controlling this access. The system will offer TACACS+/RADIUS services. It should be possible to integrate the system with Windows Active Directory or any LDAP (Lightweight Directory Access Protocol) system.

Apart, Bidders need to provide the following:

(i) Internet and Site Connectivity Routers specifications
(ii) Firewall with Integrated or External IPS
(iii) Core Switches
(iv) Access Switches
(v) SSL-VPN Solution
(vi) Link Load Balancer
(vii) Platform with Radius and TACACS + services
(viii) Network & Security Management System with security event Correlation.
(ix) Security Management Solution

Bidders are expected to visit and verify the existing infrastructure & equipment available at RITES Data Centre and propose to use either the same equipment or propose new equipment as per solution requirement of the RFP. In case of using the existing equipment, it will be responsibility of the Bidder to provide onsite support for these equipments for entire contract duration alongwith a back-to-back agreement with the OEM.

Technical Solution

The bidder is required to describe the proposed Technical Solution (Proposed Solution / Design architecture description for the Data Centre) in their Technical Bid. The following should be captured in the explanation:

1. Clear articulation and description of the design and various components including maker of equipment (including diagrams and calculations wherever applicable)
2. Extent of compliance to technical requirements
3. Clear articulation of benefits to Client of various components of the solution vis-à-vis other options available
4. Strength of the bidder to provide services including examples or case-studies of similar solutions deployed for other clients
5. Power Consumption of all offered products like Security Infrastructure, PAC, and UPS etc. in the proposal for Data Centre.
6. Project Plan (Implementation Strategy cum Methodology): Bidder shall provide a detailed project plan with timelines, resource allocation, milestones etc. in for supply, installation and commissioning of all components as part of the scope of Data Centre.
7. SLA Management and Methodology Proposed
8. The technical proposal shall also contain bidder's plan to address the key challenges anticipated during the execution of the project. The bidder is expected to provide bill of materials for the purpose of Data Centre as part of technical proposal without price quote. The Bill of materials/ deliverables as given in the technical solution should be in consonance with the commercial proposal. Any deviations between technical and commercial proposals shall make the proposal as being unresponsive and may lead to disqualification of the proposal. RITES reserves the right to take appropriate action in this regard.

Technical specifications for the Data Centre Built

I Introduction

It is proposed to create the State of the Art Data Center for RITES to consolidate the services application and infrastructure. The Data Center would provide many functionalities & IT Services like central repository of secure Servers, data storage, online delivery of services, services portal, intranet portal, remote management and service integration etc.

The Data Center (DC) is identified as one of the important element of the core infrastructure for any organization while creating IT physical infrastructure that offers high reliability and availability.

The Data Center should be designed on Green Energy Concepts and using Energy Efficient Equipments. This is a Turnkey Project and the bidder will be solely responsible for the complete end to end life cycle of the project including procurement, deployment, vendor (subcontractors) management, products inter-

Operability , integration and ongoing support. As a part of this bid RITES will deal with only the bidder as a single point of contact.

The Data Centre need to have at least:

- Two independent power supplies from independent sources (to be arranged by Customer)
- Two Critical load Modular UPS & two service load UPS each with independent set of batteries (to be provided by IT Implementing Agency). Batteries shall be able to carry full load for 30 minutes. Both UPS should be of the same make.
- Two diesel generator sets each capable of catering to full load for 24X7 operation
- Precision AC systems each capable of complete precision cooling of critical areas of data center.
- Comfort AC systems each capable of complete cooling of non-critical areas of data center.
- The power sources & cooling sources feeding data center must have multiple paths to reach destination. Each path must also be able to cater to full load.

Layout of Data Centre

Data centre area is logically divided in Zones based guidelines. Each of these zones are having different objective described further in this section. The respective area of each Zone would actually vary, primarily on the basis of number of applications and Size of the Servers

Total DC area would be approximately 400 sq feet. Dimensions of different zones are given in layout. For security purposes the entire floor would be under video surveillance and every movement will be monitored, all the doors accessible to Server Farm will have Biometric and Smart Card based Security

- Zone A – This DC Server room area would host servers, server racks, storage racks and Networking component etc.
- Zone B – Comprises of NOC room, BMS and Control room, staging room as shown in the layout.
- Zone C – Comprises of room for power panels, UPS, Fire suppressions etc.

A detailed description of key areas of Data Centre is given below:

i) Server Farm Area

The server farm area within the DC will host / co-locate Intranet Web Servers, Authentication Server, and various Departmental Application Servers including the Database Servers. These servers may be Low end to High-end depending upon the applications hosted on them. These servers may be online or only for repository purpose. The applications, which are running on the central-computing servers, will have load balancing and high availability features. This area will also contain all the networking components from routers, switches to passive components with caged aluminum partition between the Servers and Telecommunication equipment. The data communication component area will terminate WAN connections, LAN Connections and host a network monitoring station for LAN & WAN. All the Data Center LAN connections will be provided through switches placed in this area. This area will also host the Security components. The security architecture will provide controlled access to the web and database servers from Internet and other networks. This would be multi-layer architecture with two layers of firewall separating the Internet, web, and database/application and Intranet zones.

ii) NOC and Staging Room

The NOC room will have all the necessary arrangements for the Database, Systems, Application, Authentication and Other Server Administrators. Per shift one administrator may be deployed by RITES for each of the categories. DC shift operators taking care of daily operational activities of DC will use this area. There will be one Data Center In charge per shift sitting in this area along with shift operators (one each for specific activities like backup, daily Data Center administration / operations etc.)

The staging room as shown in the layout is used for the testing of servers before installing them in the server room. The Raised floor will be provided in the staging room.

iii) BMS room

This area will be used for monitoring and operation of the Physical infrastructure area. This area will normally be manned 24 X 7 for operation and maintenance purpose to take the stock of the situation and fight out the exigencies such as Fire, Forced entry into the secure area, outside threats as well as power failure etc.

iv) UPS & Electrical Room

This area shall house all the Un-Interrupted Power Supply Units and Batteries accompanying this component. As these components generate good amount of radiation it is advised to house these components in a room separate from main room.

Power Supply redundancy to all components of data centre shall be maintained through dual power sources coupled with static transfer switches rather than electrical or mechanical change over switches to avoid sparking during change over.

Considering heat generated in present day servers, the air volume required to have desired cooling is enormous. General power requirement per Rack Location Unit (RLU) is about 5 KW with cool air requirement of 800 Cubic Feet per Minute (CFM) (Air volume requirement is 160CFM per KW)(Typical rack width is 19”/23”, depth is 35” to 42” & height is 79” for 42U). 5KW per rack being medium density accounts for vertical cooling wherein airflow is horizontal and there is uniform CFM across the face of the rack without any stratification.

The height of false flooring is two feet. False ceiling height shall be at least 1.5 feet above maximum panel height. Cooling capacity of air-conditioning too shall be dependent on it. The air-conditioning in above critical areas is precision air conditioning (HVAC) where humidity, airflow & temperature etc. are finely controlled. Moreover, sensible heat ratio is 95% in precision air

conditioners in comparison to 30% for comfort air conditioners. Other areas of data centre like offices; stores, conference rooms etc. have comfort Air Conditioning. Redundancy is suggested for air conditioning even for non-critical areas of data centre.

Considering the vitality of critical areas, fire detection system has to be aspirating type in such areas with inert gas based fire extinguishing system. Aspirating type detectors are highly sensitive ones (about 1000 times sensitive in comparison to addressable type) & change their sensitivity depending on ambient conditions. Other areas may have addressable type fire detectors with conventional fire extinguishing system.

Data Centers hold vital in formations of the utility. Hence it is essential for Data centers to have controlled access & CCTV system. Data Centre must also have provision for controlled entry. The access control system shall deploy proximity technology for automatic door operation in non-critical areas & biometric technology for critical areas. Data Center must also have CCTV system integrated to BMS for surveillance of unauthorized entry into it.

Data Centre must also have Water leak detection system to detect any water leakages in AC system & hence protect data centre from water ingress.

Data Centre must also have a Building Management System for monitoring & control of infrastructure facilities BMS shall be integrated with access control system, data centre power supply system, air-conditioning system, fire detection & suppression system etc.

II General Specifications and requirements

The Conditions of Contract, Schedule of Quantities and the drawings shall be read in conjunctions with this specification and matters referred to, shown or described in any of the former are not necessarily repeated in the latter. The work under this contract shall be carried out in accordance with the Specifications, Drawings, Schedule of Quantities forming part of this Contract and the latest Indian Standard Specifications and Codes of Practice referred to in this Specification. All the items of SOR (Schedule of Rates) include the supply and execution complete, including labour, material, tools, tackles, taxes, carriages, and transportation complete in all respects. Contractor shall execute the work in accordance with the decision of the Project Manager of RITES and under no circumstances; the Contractor shall carry out the works on the basis of his own interpretation and understanding on the apparent discrepancy. It will however be deemed that the contractor has quoted on the basis of the description of the BOQ . The Decision RITES shall be final.

RITES reserves the right to modify the technical specifications / quantities / requirements mentioned in this RFP even after pre-bid, without assigning any reason whatsoever. RITES also reserves the unconditional right to place initially part order for DG Set, PAC, CAC and other subsystems and if required may place the order for balance quantities during the period of six months after issuance of completion certificate by the Head IT of RITES.

Coordination

As the work is being executed at RITES building, strict adherence to their working shall be adhered. No labour shall be allowed to stay in the campus and passes shall be got made from RITES administration as per the rules.

III Civil and Furnishing Works

1. Access (False) Floor

Providing and fixing Access floor systems of preferred make as per following specifications confirming to EN 12825 or equivalent standards.

System: Access floor system to be installed will provide a maximum finished floor height of 600 mm from the existing floor level. The system will provide for suitable pedestal and under-structure designed to withstand various static loads and rolling loads subjected to it in an office / server / DCS / panel / rack area. The entire Access floor system will provide for adequate fire resistance, acoustic barrier and air leakage resistance.

Panels: Panels will be made up of inert material Calcium sulphate having Antistatic properties in accordance with IEC 6100-4-2. The bottom of the panel shall be of 0.05 mm Aluminum foil to create a fire and humidity barrier and this should provide floor's electrical continuity. Panels will remain flat through and stable unaffected by humidity or fluctuation in temperature throughout its normal working life. The Panels will be UL listed/ FM/DM approved. Panels will provide for impact resistance top surfaces minimal deflection, corrosion resistance properties and shall not be combustible or aid surface spread of flame. Panels will be insulated against heat and noise transfer. Panels will be 600 x 600mm x 35 mm height fully interchangeable with each other within the range of a specified layout. Panels shall rest on the grid formed by the stringers which are bolted on to the pedestals. Panels shall be finished with anti-static 0.9 mm Laminate and 0.45 mm thick plastic edge material that is self-extinguishing and will be PVC free

Panel Loading: Concentrated point load: 450 Kg as per European standard EN 12825*. Uniformly Distributed Load (UDL): 2000 Kg/M2.

Fire Rating:The Panels will confirm to class O and Class 1 Fire Ratings tested `as per CIRC 9 1/61 or BS 476 Part 6 & 7 (60 min).

Pedestals: Pedestal installed to support the panel will be suitable to achieve a finished floor height of 600mm. Pedestal design will confirm speedy assembly and removal for relocation and maintenance. Pedestal base to be permanently secured to position on the sub-floor. Pedestal assembly will provide for easy adjustment of leveling and accurately align panels to ensure lateral restrain. Pedestals will support an axial load of 1500 Kgs, without permanent deflection and an ultimate load of 3000 Kgs. Pedestal head will be designed to avoid any rattle or squeaks.

Pedestal Assembly: The structure is made entirely of galvanized steel consisting of hexagonal shaped, 89 mm diameter, and 1.5 mm thick base plate, with 6 shaped stiffening ribs with niches that improve adhesion and with 5 holes mechanical fastening to the ground. The assembly will provide a range of height adjustment up to 2 5mm, with the help of check nuts.

Understructure: Understructure system consists of stringers of size 525 x 30x 25 x 0.8 mm thick to form a grid of 600 x 60 0mm. These stringers are locked into the pedestal head and run both ways. The Understructure system will provide adequate solid, rigid and quiet support for access floor panels. The Uuderstructure system will provide a minimum clear, uninterrupted height of 600 mm between the bottom of the floor and bottom of the access floor for electrical conducting and wiring.

Stringers: Stringer system is composed of a special frame, made of pressed galvanized steel plate and with a section 25mm wide, 30 mm high and 0.8 mm thick. The longitudinal ribs

and flaps in the lower part should be designed to increase flexion resistance. The grid formed by the pedestal and stringer assembly will receive the floor panel.

2. False ceiling:

The top false ceiling would have 18 inches of space form the bottom of the beam in the server room. The lay in type metal ceilings should be made of naturally strong light-weight aluminum, zinc coated steel or stainless steel, pre-painted and treated for long life, rust free performance, and fire and moisture resistance. All metal ceilings must be designed for simple and economical installation on standard exposed systems or purpose designed grids which are easy to install and remove with minimum tools. The salient features for the false ceiling should be as under: - Fully demountable - Easy to replace - Easy access to plenum Metal tile and grid construction should enable frequent access to plenum without damage. The flexibility of the grid system should be such that it enables easy integration of services such as lighting, smoke detectors, speakers, sprinklers and air grilles. The metal ceilings should be supplied with a range of acoustic treatments depending on the balance between intelligibility and confidentiality is to be achieved.

Apart from defining the visual appearance of the product, the perforation should also influence the acoustic performance of the ceiling. The perforated tiles should have nominal 10 mm plain border and have overall perforation. Metal ceilings should offer a range of light reflectance values between 63 & 87%. Products offer should be supplied finished with a durable, electrostatic factory applied polyester powder or coil coat. Metal ceiling products should be naturally strong and impact resistant. For additional security, it should be secured to their supporting grid structures making them suitable for areas where preventing unauthorized access to the ceiling plenum is a requirement. All metal ceilings should be designed for simple and economical installation on standard exposed systems or purpose designed grids and engineering standards. The metal ceilings are to be manufactured to meet or exceed EN 13964 and to be installed as per the standard industry practice using all the required accessories.

IV. Electrical Works

This specification shall be applicable to all equipments to be supplied and erected under this package in accordance with detailed scope of work and accompanying electrical sections. Contractor shall provide fully compatible electrical system, equipments, accessories and services for entire area under his scope as well as those specially required by the Owner if any.

All equipments, materials and system shall in general confirm to the latest edition of relevant national and international codes & standards, specially the Indian statutory regulations. The accompanying specification shall indicate the applicable codes and standards. The equipment/material/systems confirming to other equivalent national and international standards shall also be considered provided the same ensures equal or better features compared to standards listed in accompanying section.

Ambient air temperature shall be taken as 50 deg. C, altitude less than 1000m from MSL and relative humidity 95% for the purpose of designing of electrical equipment. This specification shall be read and constructed in conjunction with the drawings and annexure to determine the scope of work. All equipment shall be capable of continuous operation satisfactorily under the following conditions:

Voltage variation: + 10%

Frequency variation: + 5%

Combined voltage & frequency variation: + 10%

Nominal system supply available shall be as follows:

Incoming: 11 kV, 3 Ph., 50 Hz, with fault level of 350 MVA, Insulation level of 28 KV/75 KV.

Utilization: 415V, 3 Ph., 4 wire, 50 Hz with fault level of 20 KA.

Codes and Standards

All equipment and materials specified herein or not, shall be designed, manufactured and tested with the latest applicable standards & Bureau of Indian standards.

All electrical equipment shall also conform to the latest electricity rules as regards safety and other essential provisions.

All electrical installation work shall comply with the requirements of the following Act / rules / codes as amended up-to date:

1. Indian electricity act.
2. Indian electricity rules.
3. National electric code published by BIS.
4. All relevant BIS codes of practice.
5. Regulations published by CEA/CERC/UERC.

Power distribution shall be designed as per the enclosed single line diagram Appendix-C.

Design Criteria

a) The equipment shall be used in medium voltage system having characteristics as listed in this specification.

b) Energy Meters shall have RS 485 port for data logging. All MCCBs/MCBs shall have auxiliary contacts to generate digital ON and OFF signal.

c) The equipment shall be installed in a hot, dusty, humid and tropical atmosphere.

d) There shall be no radio interference when the equipments are operated at maximum service voltage.

e) The maximum temperature in any part of the equipment at specified rating shall not exceed the permissible limits as stipulated in the relevant standards.

f) The equipment shall be capable of withstanding the dynamic and thermal stresses of listed short circuit current without any damage or deterioration.

g) All equipment, accessories and wiring shall have tropical protection, involving special treatment of metal and insulation against fungus, insects and corrosion.

h) The safety clearances of all live parts of the equipment shall be as per relevant standards.

i) All equipment/components of identical rating shall be physically and electrically interchangeable.

j) All outdoor equipment shall be suitable to mount on steel structure connectors shall be bimetallic conductor.

k) Wherever single core cables are terminated in any equipment, gland plate shall be of aluminum (3-4 mm thick).

l) There shall be no straight through joints in power & control cables.

m) All cable terminations shall be with double compression cable gland with armour holding system.

n) The lighting fixture shall have loop in & loop out facility.

Installation, Testing and Commissioning of Electrical Equipments, Cabling, Grounding & Illumination System

Responsibility

The contractor shall be fully and finally responsible for proper erection, safe and satisfactory operation of plant & equipment under his scope of work to the entire satisfaction of the Engineer Incharge.

The work shall be executed in accordance with the directions, instructions, drawings and specifications which shall be supplied to the Contractor by the Engineer Incharge from time to time.

If, in the opinion of the contractor, any work is insufficiently specified or require modification, the contractor shall refer the same in writing to the Engineer Incharge and obtain instruction/approval before proceeding with the work.

If the contractor fails to refer such instances, any excuse for the faulty erection, poor workmanship or delay in completion shall not be entertained.

Equipment and material which are wrongly installed shall be removed and reinstalled to comply with the design requirement at the contractor's expense, to the satisfaction of the RITES.

Supervision

The Engineer Incharge shall have the overall responsibility for coordination of contractor's work and their direction shall be final.

Such direction and supervision however shall not relieve the contractor of his responsibility of correctness and quality of workmanship and of other obligation under the contract.

Drawings

Drawings and schedules enclosed with this specification are for general guidance of the Bidder to assess the type and volume of work involved.

These drawings & schedules will be revised to suit the actual requirement in related systems. Additional drawings & schedules will also be furnished to contractor if/when necessary.

Final drawings & schedules will be furnished to the contractor from time to time as detailed designs are developed.

Such revisions, corrections, additions to drawings & schedules shall not be considered to change the scope of work.

The contractor shall mark in red on one (1) set of drawings all deviations/alterations, not shown on drawings but carried out at field. After completion of work, the contractor shall furnish a set of marked-up prints of "As Built" drawings to the RITES.

Extra / Additional Work

The contractor shall, when requested by the RITES, perform extra electrical work and furnish extra materials not covered under his scope of work. The contractor shall be paid for all such work/material. The decision of the DGM () of RITES for such extra payment will be final and binding.

Methods and Workmanship

All work shall be installed in a first class, neat workmanlike manner by mechanics/electricians skilled in the trade involved. The erection work shall be supervised by competent supervisors holding relevant supervisory license from the Government.

All details on installation shall be electrically and mechanically correct. The installation shall be carried out in such a manner as to preserve access to other equipment installed.

Protection of Work

The contractor shall effectively protect his work, equipment and materials under his custody from theft, damage or tampering. Finished work, where required, shall be suitably covered to keep it clean and free from defacement or injury.

For protection of his work, contractor shall provide fencing and lighting arrangement, connect up space heaters and provide heating arrangement as necessary or directed by the Engineer.

Contractor shall be held responsible for any loss or damage to equipment and material issued to him until the same is taken over by the Owner according to contract.

Safety Measures

All safety rules and codes as applicable to work shall be followed without exception.

All safety appliance and protective devices including safety belts, hand gloves, aprons, helmets, shields, goggles, etc. shall be provided by the contractor for his personnel.

The contractor shall provide guards and prominently display caution notices if access to any equipment/area is considered unsafe and hazardous.

Cooperation

The contractor shall, at all times, work in close coordination with the RITES Supervising personnel and afford them every facility to become familiar with erection and maintenance of the equipment.

The contractor shall arrange his schedule of work and the method of operation to Minimize inconvenience to other contractors working on the project.

In case of any difference between contractors, the decision of the RITES shall be final and binding on all parties concerned.

Erection Program and Progress

The contractor shall submit at such times and in such forms as may be requested by the Engineer Incharge, schedule showing the program and the order in which the contractor proposes to carry out the work with dates and estimated completion time for various parts of the work. Such schedules shall be approved by the Engineer Incharge prior to starting the erection.

The contractor shall adhere to this approved program for all practical purposes. If, for any reason, the work is held up, the contractor shall bring it to the attention of the Incharge in writing without any delay.

During the progress of work, the contractor shall submit fortnightly progress report and such other reports on erection work as the Engineer Incharge may direct.

If, in the opinion of the Engineer Incharge, the progress of erection work by the contractor at any stage needs expediting so as to ensure completion of work within the stipulated time, the RITES shall have the right to instruct the contractor to increase contractor's man-power in appropriate categories and/or the working hours per day and/or erection tools & tackles and the contractor shall comply with such instruction forthwith.

Consumables and Hardware

The contractor shall furnish all erection materials, hardware and consumables required for the completed installation.

The materials shall include but not limited to the following:

a. Consumables: Welding rods & gas, oil & grease, cleaning fluids, paints, electrical tape, soldering materials etc.

b. Hardware: Bolts, nuts, washers, screws, brackets, supports, clamps, hangers, saddles, cleats, sills, shims, etc.

c. Materials: Junction boxes, terminal blocks, connectors, ferrules, lugs, brass glands, rigid/flexible conduits, cables, ground wires, etc. Supply of cement, sand, stones, etc. required for the execution of the contract shall be the responsibility of the contractor.

Erection Tools & Tackles

The contractor shall provide all tools, tackles, implements, mobile equipment, such as crane, tailors, scaffoldings, ladders, etc. Which are required for transportation, handling and erection of the equipment and materials.

Special erection tools, if any, furnished by the manufacturer along with the equipment may be used by the contractor. Such tools shall be returned in good conditions to the Owner on completion of work.

Owner's tools & equipment, if and when available, may be hired by the contractor by his own payment of charges.

Testing Equipment

The testing equipment that is required for testing is to be provided by the contractor, during the testing of the installed equipments at Data Center.

Few are listed below:

a. Power operated meggar of 10,000V and 1000V grade for insulation testing.

b. Hand operated meggar of 1,000V grade for insulation testing.

c. Hand driven earth resistance meggar of range 0- 1/3/30 ohms.

d. Tong testers of suitable ranges.

Installation - General

Installation work shall be carried out in accordance with good engineering practices and also manufacturer's instructions/recommendations where the same are available.

Equipment shall be installed in a neat workmanlike manner so that it is leveled, plumbed, squared and properly aligned and oriented. The equipment will be furnished in a dis-assembled condition as received at site.

The contractor shall assemble all these parts, mount and wire-up loose equipment, fittings and accessories and complete with all connections.

Equipment will generally be supplied with necessary floor/support steel; holding down bolts, nuts, anchors, etc., Contractor shall furnish and install all bolts, nuts, screws and anchors as required completing the installation.

Any internal wiring of the equipment which has beenall erection tests and measurements. The contractor shall submit copies of those *t* left incomplete because of shipping split or which requires minor modifications shall be carried out by the contractor.

All erection work shall be carried out in strict with manufacturer's instructions and shall include all compliance necessary adjustments, checks and measurements.

The contractor shall record results of *est* results to the RITES for their reference and record.

a. Switchgear, Control Panels, PMCCs, Distribution Boards

Switchgear, Control Panels, Power and Motor Control Centers, Distribution boards, etc. will be split up in sections for ease of transportation and handling. All breakers, bus bars, relays, meters and control switches will be supplied loose to be mounted and connected at site as per the relevant drawings which shall be supplied to the contractor for necessary mounting, wiring and connection work at site.

All alignment, leveling, grouting, anchoring, tack welding, adjustments and oil conditioning shall be carried out in accordance with manufacturer's instructions and/or as directed by the Engineer Incharge.

All connections in the Switchgears, Control Boards, Distribution boards, etc. shall be completed, checked and adjusted to ensure safety and satisfactory operation of the equipment.

In some cases, some modifications may have to be carried out at site in the wiring of an equipment to meet the requirements of the desired control scheme and the contractor shall have to do same at no extra cost.

b . Miscellaneous items and Local Panels

The contractor shall install miscellaneous local panels as listed in schedules.

These equipment/panels will be generally wall or column mounted excepting a few which may be floor mounted. The exact locations will be as decided by the Engineer Incharge at site and as shown in the final drawings.

All support or brackets needed for installation shall be fabricated by the contractor at site.

All welding, cutting, chipping and grouting as and when necessary shall be carried out by the contractor at no extra cost.

Cable installation work shall mean erection of cable trays/racks, supports, hangers, junction boxes, conduits, laying of cables either in ground or on trays inside trenches tunnels/overhead trays in conduits etc. dressing and clamping, jointing and termination inclusive of supply of necessary jointing/termination kits, lugs, glands, ferrules, tapes, etc. and other accessories, grounding of cable armor. In case of direct laying in ground, all excavation work, necessary back-filling, supply of bricks and protective concrete slabs, removal of excess earth shall be part of the installation work.

Grounding installation work shall mean erection, jointing/brazing/welding, connection and painting, testing of ground conductors excluding supply of necessary steel/copper.

c . Cable Trays

Pre-fabricated cable trays and accessories shall be assembled & erected at site as per instructions of manufacturer. Alternatively, the contractor shall fabricate & install all cable trays, racks, risers, shafts & supports.

Cable trays either inside concrete trenches or inside buildings and racks inside cable shafts shall be aligned and levelled properly. All tray runs shall be installed parallel to the trench/building walls and floors except otherwise noted in the drawings.

The contractor shall have to secure rack/tray supports by welding to inserts or other available building steel surfaces. Outdoor trays shall be installed by welding on the steel/concrete structures with inserts by the contractor.

In case of non-availability of embedded steel inserts in certain tray routes, the contractor shall have to secure the supports on wall/floor/ceiling surfaces by suitable anchoring system having adequate load bearing capability.

As far as practicable, cable trays shall be supported from one side only in order to facilitate installation and maintenance of cables from the other side.

The cable trays shall be supported in general at a span of 1.5 meters horizontally and at a distance of 1.0 meter vertically.

Sufficient spacing not less than 250 mm shall be provided between trays and maintained to permit adequate access for installing and maintaining the cables.

d. Cable and Conduits

The contractor shall install, terminate and connect up all cable and conduits as per drawings and cable schedules.

The drawings shall be strictly followed except where obvious interference occurs. In such cases, the routing shall be changed as directed and/or approved by the Engineer Incharge.

Approximate lengths of cable and conduit runs will be given in the cable schedule for guidance only. Before commencement of work, the contractor shall take actual measurements and prepare his own cable cutting schedule to reduce wastage to a minimum.

During the erection period, the contractor shall furnish a fortnightly report on cable position in an approved Performa so as to keep the RITES apprised of the position and to enable him to initiate any procurement action in time.

The contractor shall also maintain and submit when requested, a record of cable insulation value when drawn from store, after laying, before and after termination/jointing.

e. Conduit and Accessories

Conduit/pipes shall be used only in short lengths in certain areas where required and/or as directed by the Engineer Incharge.

The contractor shall furnish all conduits complete with accessories as required.

Conduits shall be flexible type in general. However, rigid type steel conduit, if required, shall also be supplied by the contractor.

Except for inside, an enclosure wherever the cable enters or leaves the conduit, the conduit end shall be sealed by suitable sealing compound having fire withstand capability.

Cables: Storage and Handling

Cable drums shall be stored on hard and well drained surface so that they may not sink. In no case shall the drum be stored on the flat, i.e. with flange horizontal. Rolling of drums shall be avoided as far as practicable for short distance; the drums may be rolled provided they are rolled slowly and in proper direction as marked on the drum. In absence of any indication, the drums may be rolled in the same direction as it was rolled during taking up the cable. For unreeling the cable, the drum shall be mounted on jacks or on cable wheel. The spindle shall be strong enough to carry the weight without bending. The drum shall be rolled on the spindle slowly so that the cable should come out over the drum and not below the drum.

While laying cable, cable rollers shall be used at an interval of 2000 mm. The cables shall be pushed over the roller by a gang of people positioned in between rollers over a suitable distance. Cable shall not be pulled from the end without having intermediate pushing arrangement. Bending radius of the cable during installation shall not be less than what is specified by the manufacturer.

Cable Laying

Cable shall generally be installed in ladder type site fabricated/pre-fabricated trays except for some short run in rigid/flexible conduit for protection or crossings.

Cables laid on trays and risers shall be neatly dressed and clamped at an interval of 1500 mm and 900 mm for horizontal and vertical cable runs. Clamps for multi-core cables shall be fabricated out of 25 x 3 mm Aluminium flats.

All power cables shall be clamped individually and control cables shall be clamped in groups of three or four cables. Prior to laying of cables inside both indoor and outdoor trenches, the contractor shall properly clean inside those trenches. In outdoor areas, buried cables shall be laid and covered with sand/riddled earth and protected from damage by bricks at sides and precast slab at top.

When buried cables cross road, additional protection shall be provided in the form of hume / galvanised iron pipes. In order to prevent fire protection through cable penetrations of wall/floor/ceiling as well as through cable shaft openings, after laying, dressing & clamping of cables, all the openings shall be properly sealed by using pieces of mineral wool butted to one another and spraying with anti-fire propagation liquid such as 'Flammastik' or equivalent.

Also the cable runs both before and after the fire seals shall be suitably sprayed with anti-fire propagation liquid at least for 1M length. After completion of installation and prior to connection, all power cables shall be subjected to a high potential test.

Cable Tags & Markers

Each cable and conduit run shall be tagged with numbers that appear in the cable and conduit schedules.

Cables and conduits shall be tagged at their entrance, every 30.0M and exit from any equipment, junction box.

The tags shall be of Aluminium with the number punched on it and securely attached to the cable by not less than two turns of nylon 6 cable ties.

The location of cable joints, if any, shall be clearly indicated with cable marker with an additional inscription 'cable-joint'. The contractor shall furnish and install all tags and markers stated above. For buried cable, the marker shall project 150 mm above ground and shall be spaced at an interval of 30 meters and at every change of direction.

Cable Termination and Connection

The termination and connection of cables shall be done strictly in accordance with manufacturer's instruction, drawings and/or as directed by the Engineer Incharge.

The work shall include all clamping, fitting, fixing, cable jointing, crimping, shorting and grounding etc. as required for heat/cold shrinking technology for the complete job.

All equipment required for all such operations shall be of contractor's procurement under this specification. Furnishing of all consumable materials, such as soldering material, electrical tape, sealing material as well as cable jointing kits shall be included in the offer.

The equipment will be generally provided with blank bottom plates for cable/conduit entry and cable end box for power cables.

The contractor shall perform all drilling, cutting on the blank plate and any minor modification work required to complete the job. If the cable end box or terminal enclosure provided on the equipment is found unsuitable and requires major modification, the same shall be carried out by the contractor at the discretion of Engineer Incharge.

Control cable cores entering Control Panel/Switchgear/PMCC etc. shall be neatly bunched and served with PVC perforated tape to keep it in position at the terminal block. The contractor shall put ferrules on all control cable cores in all junction boxes and at all terminations. The ferrules shall carry terminal numbers with cross reference as per drawings. All ferrules shall be colored, plastic and interlocked

type. Spare cores shall be similarly ferruled, crimped with lug and taped on the ends.

Spare cores shall be ferruled with individual cable number. Termination and connection shall be carried out in such a manner as to avoid strain on the terminals. All cable entry points shall be properly sealed and made vermin and dust-proof. Unusual opening, if any, shall be effectively closed. Sealing work shall be carried out with approved sealing compound having fire withstand capability for at least three hours.

Conduits shall be clamped on to approved type spacer plates or brackets by saddles or U-bolts. The spacer plates or brackets, in turn, shall be fixed to the building steel by welding and to concrete or brick work by grouting as shown on drawings.

Cable Joints

Cable shall be installed without joints as far as practicable. If, however, jointing becomes necessary, it shall be made only by qualified cable jointer and strictly in accordance with manufacturer's recommendation.

Illumination System

a. Lighting Fixtures

Fixtures shall be mounted on false ceiling grid with suitable chain and clamps. No cutting or drilling of false ceiling structures is permitted.

The fixtures after erection shall be marked up indelibly with corresponding circuit number for easy identification of lamp circuit.

b. Conduit System

In case of unarmored cable, all conduits shall originate from the respective lighting panel and terminate in lighting fixtures, receptacles, etc.

Exposed conduits shall be run in straight lines parallel to building columns, beams and walls as far as practicable. Unnecessary bends and crossings shall be avoided to present a neat appearance.

Conduit supports shall be provided at an interval of 750 mm for horizontal runs and 1000 mm for vertical runs.

Wooden plug inserted in the masonry or concrete for conduit support is not acceptable.

Embedded conduits shall be securely fixed in position to preclude any movement. In fixing embedded conduit, if welding or brazing is used, extreme care should be taken to avoid any injury to the inner surface of the conduit.

Spacing of embedded conduits shall be such as to permit flow of concrete between them and in no case shall be less than 38 mm.

Where conduits are run on cable trays provided by Owner, they shall be clamped to supporting steel at an interval of 600 mm.

White lead is suitable for application on embedded conduit and red lead for exposed conduit.

The battery room installation shall be made with acid fume-proof conduits.

Field bends shall have a minimum radius of four (4) times the conduit diameter. All bends shall be free of kinks, indentations or flattened surfaces. Heat shall not be applied in making any conduit bend.

- The entire metallic conduit system, whether embedded or exposed shall be electrically continuous and thoroughly grounded.

For directly embedding in soil, the conduits shall be coated with an asphalt - base compound. Concrete pier or anchor shall be provided where necessary to support the conduit rigidly and to hold it in place.

Conduits shall be installed in such a way as to ensure against trouble from trapped condensation.

Running threads shall be avoided as far as practicable. Where it is unavoidable, check nuts shall be used.

Conduits shall be kept, wherever possible, at least 300 mm away from hot pipes, heating device, etc. when it is evident that such proximity may impair the service life of cables.

Slip joints shall be provided when conduits cross structural expansion joints or where long run of exposed conduits are installed, so that temperature change will cause no distortion due to expansion or contraction of conduit run.

For long run, junctionpull boxes shall be provided at suitable intervals to facilitate wiring.

Conduits shall be securely fastened to junction box or cabinets each with a locknut and insulated bushing inside the box and locknut outside.

Conduit lengths shall be joined by screwed couplers. Couplers shall be clearly cut.

Conduit joints and connections shall be made thoroughly water-tight and rustproof by application of a thread compound which will not insulate the joints.

- Lighting fixture shall not be suspended directly from junction box in the main conduit run.
- Conduits and fittings shall be properly protected during construction period against mechanical injury. Conduit ends shall be plugged or capped to prevent entry of foreign material.
- After installation, the conduits shall be thoroughly cleaned by compressed air before pulling in the wire.

c. Wiring

Wiring shall be generally carried out by FRLS wires in conduits. All wires in a conduit shall be drawn simultaneously. No subsequent drawing is permissible.

Wire shall not be pulled through more than two equivalent 90° bends in a single conduit run.

Wiring shall be spliced only at junction boxes of with preferred make terminal blocks having anti-vibration terminals. Maximum two wires can be connected to each way of the terminal block.

For lighting fixtures, connection shall be teed off through suitable round conduit or junction box, so that the connection can be attended without taking down the fixture.

For vertical run of wires in conduit, wires shall be suitably supported by means of wooden/hard rubber plugs at each pull/junction box.

Normal and Emergency circuits shall not be run in the same conduit.

Receptacle sub-circuits shall be kept separate and distinct from lighting and fan sub-circuits.

Separate neutral wire shall be provided for each circuit. Wiring throughout the installation shall be such that there is no break in the neutral wire in form of switch or fuse.

e. Grounding

The Contractor shall carry out the grounding of all electrical equipment, steel structures, etc. Excavation and backfilling, if required, shall be performed by the Contractor at no extra cost.

The grounding shall be done by copper conductors / strips of sizes as laid down in BOM and the same shall be connected to the risers of main ground mat.

In case of site fabricated cable tray/ladder, the runner angles shall be used as ground conductors and shall be made electrically continuous.

All ground conductor connections shall be made by electric arc welding/brazing unless otherwise specified. Ground connections shall be made from nearest available station ground grid risers.

All ground conductors WELDED/BRAZED connection shall be painted black for prevention of corrosion.

Equipment will generally be furnished with two separate ground pads with tapped holes, bolts and spring washers. If, however, the same are not furnished, Contractor shall drill and tap holes and provide bolts, spring washer for connection.

Equipment ground connections, after being checked and tested by the Engineer Incharge, shall be coated with anti-corrosive paint. Whether specifically shown or not, all conduits, trays, cable armour and cable end box, electrical equipment, such as motors, switch boards, panels, cabinets, junction boxes, lock-out switches, fittings, fixtures, etc. shall be effectively grounded.

All equipment, supporting steel structures, panels, boards, switchgears, junction boxes, conduits, etc. shall be grounded in compliance with the provision of I.E. Rules and as per enclosed grounding notes and details.

All ground connections shall be made from nearest available station ground grid.

All connections to ground grid shall be done by arc welding unless otherwise stated.

f. Cleaning up of Work Site

The Contractor shall, from time to time, remove all rubbish resulting from execution of his work. No materials shall be stored or placed on passage or drive ways. Upon completion of work, the Contractor shall remove all rubbish, tools, scaffoldings, temporary structures and surplus materials, etc. to leave the premises clean and fit for use.

g. Inspection & Testing

On completion of erection works, the Contractor shall request the Engineer Incharge for inspection and tests. The Engineer Incharge shall arrange for joint inspection of the installation for completeness and correctness of the work. Any defect pointed out during such inspection shall be promptly rectified by the Contractor.

The installation shall be then tested and commissioned in presence of the Engineer Incharge and put on trial run for stipulated contract period. All rectification, repair or adjustment work found necessary during inspection, testing, commissioning and trial run shall be carried out by the Contractor without any extra cost.

h. Commissioning and Trial Run

Following successful inspection and testing, the equipment shall be commissioned and put on trial run along with the main plant in a manner mutually agreed upon based on the commissioning schedule of main plant. The Contractor should perform commissioning and trial run with men and material as required and/or as directed Engineer Incharge.

i. Taking over of Installation

On successful testing, commissioning and trial run, the Contractor shall request Engineer Incharge in writing for taking over the installation. The Engineer Incharge, on receipt of the request, shall arrange to take over the installation either wholly or in part as the case may be after a final inspection. Till such taking over, the responsibility of the whole installation against theft or damage of any kind shall remain with the Contractor.

Main LT Panel

a. Scope

This scope shall cover design, manufacture, check test, and supply, installation, testing and commissioning of medium voltage Panel Board as described in this specification, as per drawings and Bill of quantities. Medium voltage Panel Board will be installed indoor and is connected through the bus duct / cables.

b. Documentation i.

Vendor shall furnish

- Drawings, data and manuals in three sets along with equipment supplied.
- General arrangement drawing indicating accessories and dimensions.
    - Foundation plan and loading.
    - Termination arrangement with dimensions.

ii. Documents to be submitted after placement of order

- As per 2.a above for comments and approval for manufacture.
- Schematic.

iii. Final documents

- As built drawings

- Instruction and maintenance manual
- Test certificates

c. General Specifications

All the Panels shall be metal clad, totally enclosed, rigid, floor / wall mounting, air insulated, cubicle type suitable for operation on three phase / single phase, 415 V / 230 V, 50 Hz., neutral effectively / non-effectively grounded at transformer and short circuit level as mentioned in the drawings.

All the panel shall be IP54 protection class construction.

The painting of all the metal part shall be as per the painting specification as defined in the specifications.

The Panels shall be designed to withstand a heaviest condition at site, with maximum expected ambient temperature of 50° c., 95% humidity.

d. Standards and Codes

The Panels shall comply with the latest edition of relevant Indian Standards and Indian Electricity Rules and Regulations. The following Indian standards shall be complied with:

IS: 4237 General requirements for switchgear and control gear for voltages not exceeding 1000 V.

IS: 375 Switchgear bus bars, main connection and auxiliary wiring, marking and arrangement.

IS: 2147 Degree of protection provided by enclosures for low voltage switchgear and control gear.

IS: 8197 Terminal marking for electrical measuring instrument and their accessories.

IS: 2551 Danger notice plates

IS: 10118 Code of Practice for installation and maintenance of switchgear.

IS : 8623 Specification for factory built assemblies of switchgear and control gear for voltage up to and including 1000 V A.C. and 1200 V D.C. IS : 8828 Miniature circuit breakers.

IS: 9224 HRC fuse links IS : 2705 Current transformer

IS: 3155 Voltage transformer IS : 3231 Electrical relay for protection IS:

1248 Indicating instrument IS : 722 Integrating instrument

IS: 6875 Control switches and push buttons IS : 2959 Auxiliary contactor Indian Electricity Act and Rules (as amended up to date) and approval of FIA of India. The Panels also require approval of the consultant at various stage of their manufacture such as design, selection, construction, testing, shipping etc.

e. Construction Cubical

Type Panels

i) Structure : The Panels shall be of compartmentalize design so that circuit arc / flash products do not create secondary faults and be fabricated out of high quality CRCA sheet, suitable for indoor installation having dead front operated and floor mounting type.

All CRCA sheet steel used in the construction of Panels shall be 2 mm. thick and shall be folded and braced as necessary to provide a rigid support for all components. Joints of any kind in sheet steel shall be seam welded, all welding slag grounded off and welding pits wiped smooth with plumber metal.

The Panels shall be totally enclosed, completely dust and vermin proof and degree of protection being not less than IP: 54 to IS : 2147. Gaskets between all adjacent units and beneath all covers shall be provided to render the joints dust proof.

All doors and covers shall be fully gasketed with foam rubber and /or rubber strips and shall be lockable.

All panels and covers shall be properly fitted and secured with the frame and holds in the panel correctly positioned. Fixing screws shall enter into holes, taped into an adequate thickness of metal or provided with bolts and nuts.

Self-threading screws shall not be used in the construction of Panels. A base channel of 75 mm. x 50 mm. x 6 mm. thick shall be provided at the bottom.

Panels shall be preferably arranged in multi-tier formation. The size of the Panels shall be designed in such a way that the internal space is sufficient for hot air movement and the electrical component does not attain temperature

more than 50°C. If necessary, openings shall be provided for natural ventilation, but the said openings shall be screened with fine weld mesh.

All electrical components shall be de-rated for 50°C. Knock out holes of appropriate size and number shall be provided in the Panels in conformity with the number, and the size of incoming and outgoing conduits / cables. Alternately, the Panels shall be provided with removable sheet steel plates at top and bottom to drill holes for cable / conduit entry at site.

The Panels shall be designed to facilitate easy inspection, maintenance and repair. The Panels shall be sufficiently rigid to support the equipment without distortion under normal and under short circuit condition. They shall be suitably braced for short circuit duty.

ii) Protection Class: All the indoor Panels shall have protection class of IP: 54.

iii) Painting: The painting shall be seven-tank process with epoxy paint.

iv) Circuit Compartments: Each MCCB shall be housed in separate compartments and shall be enclosed on all sides. Sheet steel hinged lockable door shall be duty interlocked with the unit in `ON' and `OFF' position. All instruments and indicating lamp shall be mounted on the compartment door. Sheet steel barriers shall be provided between the tiers in a vertical section.

v) Instrument Compartments: Separate adequate compartment shall be provided for accommodating instruments, indicating lamps, control contactors / relays and control fuses etc. These components shall be accessible for testing and maintenance without any danger of accidental contact with live parts, bus bar and connections.

vi) Busbars: The Busbar shall be air insulated and made of high quality, high conductivity, high strength Aluminum.

The busbar shall be of 3 phases and neutral system with separate neutral and earth bar. **The size of neutral busbar in all main panels or lighting panels and feeders for panel shall be equal to phase busbar.** The busbar and interconnection between busbars and various components shall be of high conductivity Aluminium.

The busbar shall be of rectangular cross-section designed to withstand full load current for phase busbars and half rated current for neutral busbars in case of MCC panels only and shall be extensible on either side.

The busbar shall have uniform cross-section throughout the length. The busbars and interconnections shall be insulated with epoxy-coated busbar. The busbar shall be supported on bus insulators of non flammable type with high creep age and high anti tracking property and non-hydroscopic SMC / DMC insulated supports at sufficiently close intervals to prevent busbars sag and shall effectively withstand electromagnetic stresses in the event of short circuit.

The busbar shall be housed in a separate compartment. The busbar shall be isolated with 3-mm. thick Bakelite sheet to avoid any accidental contact.

The busbar shall be arranged such that minimum clearances between the busbar are maintained as below:

Between phases	: 25 mm. minimum
Between phases and neutral	: 25 mm.
Between phases and earth	: 25 mm.
Between neutral and earth	: 20 mm. minimum

All busbar connections shall be done by drilling holes in busbars and connecting by chromium plated or tinned plated brass bolts and nuts. Additional cross-section of busbar shall be provided in all Panels to cover up the holes drilled in the busbar. Spring and flat washers shall be used for tightening the bolts.

All connections between busbars and circuit breakers / switches and cable terminals shall be through aluminum strips of proper size to carry full rated current. These strips shall be insulated with insulating taps.

Panel to panel entry of bus bar shall be effectively sealed by electrical and thermal insulation barriers so that products of flashover do not travel from one panel to another panel creating multiple faults.

Busbar calculated on 50 deg. C. ambient temp. and 85 deg. C. for continuous and short time rating. Busbar surrounded air temp. shall be considered 70 deg. C. for busbar calculation.

All joint shall have non-flammable insulation shrouds for secondary insulation purpose

vii) Electrical Power and Control Wiring Connection: Terminal for both incoming and outgoing cable connections shall be suitable for 1100 V grade,

aluminum / copper conductor XLPE insulated and PVC sheathed, armoured cable and shall be suitable for connections of solder less sockets for the cable size as indicated in the Bill of Material.

Power connections for incoming feeders of the main Panels shall be suitable for 1100 V grade aluminum conductor (XLPE) cables.

Both control and power wiring shall be brought out in cable alley for ease of external connections, operation and maintenance. Both control and power terminals shall be properly shrouded.

10% spare terminals shall be provided on each terminal block. Sufficient terminals shall be provided on each terminal block, so that not more than one outgoing wire is connected to per terminal.

Terminal strips for power and control shall preferably be separated from each other by suitable barriers of enclosures.

Wiring inside the modules for power, control, protection and instruments etc. shall be done with use of 660 / 1100 V grade, **FRLS** insulated copper Conductor cables conforming to IS. For current transformer circuits, 2.5 sq.mm. Copper conductor wire shall be used. Other control wiring shall be done with 1.5 sq.mm. Copper conductor wires. Wires for

connections to the door shall be flexible. All conductors shall be crimped with solder less sockets at the ends before connections are made to the terminals.

Control power supply to modules through the control transformer Control power wiring shall have control fuses, (HRC fuse type) for circuit protection. All indicating lamps shall be protected by HRC fuses.

Particular care shall be taken to ensure that the layout of wiring is neat and orderly. Identification ferrules shall be filled to all the wire termination for ease of identification and to facilitate checking and testing.

"CUPAL" washers shall be used for all copper and aluminum connections. Final wiring diagram of the Panels power and control circuit with ferrules numbers shall be submitted along with the Panels as one of the documents against the contracts.

viii) **Terminals:** The outgoing terminals and neutral link shall be brought out to a cable alley suitably located and accessible from the panel front. The current transformers for instruments metering shall be mounted on the disconnecting type terminal blocks. No direct connection of incoming or outgoing cables to internal components of the distribution board is permitted; only one conductor may be connected in one terminal.

ix) **Wireways :** A horizontal / vertical either metal or Alumininium wire way with screwed covers shall be provided at the top to take interconnecting control wiring between different vertical sections.

x) **Cable Compartments :** Cable compartments of minimum **300 mm** size shall be provided in the Panels for easy termination of all incoming and outgoing cables entering from bottom or top. Adequate supports shall be provided in the cable compartments to support cables. All outgoing and incoming feeder terminals shall be brought out to terminals blocks in the cable compartment

xi) **Earthing:** AL earth bars of 50 mm x 10 mm shall be provided in the Panels for the entire length of the panel. The framework of the Panels shall be connected to this earthbar. Provisions shall be made for connection from this earth bar to the main earthing bar coming from the earth pit on both sides of the Panels. The earth continuity conductor of each incoming and outgoing feeder shall be connected to this earth bar. The armour shall be properly connected with earthing clamp, and the clamp shall be made for connection from this earth pit on both sides of the Panels. The earth continuity conductor of each incoming and outgoing feeder shall be connected to this earth bar. The armour shall be properly connected with earthing clamp, and the clamp shall be ultimately bonded with the earth bar.

xii) **Labels:** Engraved PVC labels shall be provided on all incoming and outgoing feeders. Single line circuit diagram showing the arrangements of circuit inside the distribution board shall be pasted on inside of the panel door and covered with transparent laminated plastic sheet.

xiii) **Name Plate:** A nameplate with the Panels designation in bold letters shall be fixed at top of the central panel. A separate nameplate giving feeder details shall be provided for each feeder module door. Inside the feeder compartments, the electrical components, equipments, accessories like switchgear, control gear, lamps, relays etc. shall suitably be identified by providing stickers. Engraved nameplates shall preferably be of 3 ply, (Red-White-Red or Black-White-Black) lamicold sheet. However, black engraved perplex sheet name plates shall also be acceptable. Engraving shall be done with square groove cutters. Nameplate shall be fastened by counter sund screws and not by adhesives.

xiv) **Danger Notice Plates:** The danger notice plate shall be affixed in a permanent manner on operating side of the Panels. The danger notice plate shall indicate danger notice both in

Hindi and English and with a sign of skull and bones. The danger notice plate, in general, meets the requirements of local inspecting authorities. Overall dimensions of the danger notice plate shall be 200 mm. wide x 150 mm. high.

The danger notice plate shall be made from minimum 1.6 mm. thick mild steel sheet and after due pre-treatment to the plate, the same shall be painted white with vitreous enamel paint on both front and rear surface of the plate. The letters, the figures, the conventional skull and bones etc. shall be positioned on plate as per recommendation of IS: 2551-1982. The said letters, the figures and the sign of skull and bones shall be painted in signal red colour as per IS: 5-1978. The danger plate shall have rounded corners. Location of fixing holes for the plate shall be decided to suit design of the Panels. The danger notice plate, if possible, be of ISI certification mark.

xv) Internal Components : The Panels shall be equipped complete with all types of required number of Air circuit breakers, soft starters, switch fuse units, contactors, relays, fuses, meters, instruments, indicating lamps, push buttons, equipment, fittings, busbars, cable boxes, cable glands etc. and all the necessary internal connections / wiring as required and as indicated on relevant drawings and Bill of Material. Components necessary for proper complete functioning of the Panels but not indicated on the drawings shall be supplied and installed on the Panels. All part of the Panels carrying current including the components, connections, joints and instruments shall be capable of carrying their specified rated current continuously, without temperature rise exceeding the acceptable values of the relevant specifications at the part of the Panels. All units of the same rating and specifications shall be fully interchangeable.

f. <u>Components</u>

The type, size and rating of the components shall be as indicated on the relevant drawings. While selection of the capacity of the components resulting from the prevailing conditions like ambient temperature shall be allowed for. The thermal and magnetic trip rating shall be compensated for the ambient temperature. The rating indicated on the drawing are, ratings anticipated at prevailing site conditions.

i. Air Circuit Breaker: Where indicated on the drawings/Annexure, circuit breaker shall be provided on the incomer and bus-coupler having minimum interrupting capacity equal to the listed fault level. Circuit breaker shall be three pole, single throw, air-break type with independent manual spring closing, trip-free mechanism. The circuit breaker shall also have electrical spring charging, electrical closing and shunt tripping facility. Circuit breaker shall be draw out type, having service, test & isolated position with positive indication for each position. Circuit breakers of identical rating shall be physically and electrically interchangeable. Each breaker shall be provided with three (3) adjustable overload release, three (3) adjustable instantaneous short circuit release and one (1) adjustable and time delayed earth fault release. The release characteristic shall be suitable for co-ordination with down-stream fuses. Microprocessor based system is to be provided. One (1)

no. common contact of above releases shall be provided to operate lockout relay. Mechanical safety interlock shall be provided to prevent the circuit breaker from being racked in or out of the service position when the breaker is closed. Automatic safety shutters shall be provided to cover up the stationary disconnects when the breaker is withdrawn. Each breaker shall be provided with an emergency manual trip, mechanical ON-OFF indicator, an operation counter and mechanism charge/discharge indicator. Each circuit breaker shall be provided with the following:

1. Position/Cell switch with 4 NO + 4 NC contacts.

2. Auxiliary switch with 6 NO + 6 NC contacts.

3. Indicating lamps. In addition to the series releases specified above, an incomer circuit breaker panels shall be provided with one (1) no IDMTL type earth fault relay having setting range of 10 to 40% of !A.

ii. **Moulded Case Circuit Breaker:** The moulded case circuit breaker (MCCB) shall be air break type and having quick make - quick break with trip free operating mechanism. Housing of the MCCB shall be of heat resistant and flame retardant insulating material. Operating handle of the MCCB shall be in front and clearly indicate ON/OFF/TRIP positions. The electrical contact of the circuit breaker shall be of high conducting non-deteriorating silver alloy contacts. The MCCB shall be provided microprocessor based overload and short circuit protection device. All the releases shall operate on common trip busbar so that in case of operation of any one of the releases in any of the three phases, it will cut off all the three phases and thereby single phasing of the system is avoided. The MCCB wherever called for in the appended drawings shall provide an earth fault protection. The MCCB shall provide two sets of extra auxiliary contacts with connections for additional controls at future date. The electrical parameters of the MCCB shall be as per the description given in the Bill of Material.

iii. **Contactors:** The contactors shall meet with the requirements of IS: 2959 and BS: 775. The contactors shall have minimum making and breaking capacity in accordance with utilization category AC3 and shall be suitable for minimum Class II intermittent duty. If the contactor forms part of a distribution board then a separate enclosure is not required, but the installation of the contactor shall be such that it is not possible to make an accidental contact with live parts.

iv. **Current Transformer:** Where ammeters are called for C.T.s shall be provided for current measuring. Each phase shall be provided with separate current transformer of accuracy Class I and suitable VA burden for operation of associated metering and controls. Current transformer shall be in accordance with IS: 2705 - 1964 as amended up to date.

v. **Indicating Lamps :** Indicating lamps assembly shall be screw type with built in resistor having non-fading colour lens. **LED** type lamps are required.

iring for Remote ON, OFF, TRIP indicating lamp is required. Colour shade for the indicating lamps shall be as below:

ON indicating lamp : Red

OFF indicating lamp : Green

TRIP indicating lamp : Amber

PHASE indicating lamp : Red, Yellow, Blue
TRIP circuit healthy lamp : Milky

g. **Shop Drawings**

Prior to fabrication of the Panels the supplier / contractor shall submit for Engineer In charge's approval the shop / vendor drawing consisting of G.A. drawing, sectional elevation, single line diagram, bill of material etc. and design calculations indicating type, size, short circuiting rating of all the electrical components used, busbar size, internal wiring size, Panels dimension, colour, mounting details etc. in 6 sets. The contractor shall also submit manufacturer's catalogues of the electrical components installed in the Panels along with the drawing.

h. Inspection

At all reasonable times during production and prior to transport of the Panels to site, the supplier / contractor shall arrange and provide all the facilities at their plant for inspection.

i. Test Certificates

Testing of Panels shall be carried out at factory and at site as specified in Indian standards by the contractor at his own cost. Representative of RITES may present at the time of Testing. The test results shall be recorded on a prescribed form. The test certificate for the test carried out at factory and at site shall be submitted in duplicate to the Engineer Incharge for approval.

Lightning Protection System:

a. Scope

The scope of work under this section covers the specifications for supply, installation, connection, testing and commissioning of lightning protection system of the following:

- Air termination network
- Roof conductors
- Down conductors
- Testing joint
- Earth termination network

b. Standards

The lightning protection system shall comply with Indian Code of Practice 2309 : 1989 and Indian Electricity Acts and Rules.

c. System

- The lightning protection system shall be installed as indicated on the drawings or in case such is not available, the contractor shall prepare one as per Indian CP 2309 and approved by Engineer Incharge.
- An air terminal shall be installed on the highest roof of the building. The air terminal shall be joined to horizontal roof conductor by means of rivets / clamps.
- Roof conductor shall be laid horizontally on the roof.
- Down conductor shall be installed on the vertical surface on the building. Down conductor shall be joined with roof conductors in the method as prescribed by the Code. A test joint shall be provided in the down conductor 100 cm. above the ground level at a place which is easily accessible for testing
- The down conductor shall be joined with an earth termination network or to the earthing station.
- The earthing station and the earthing conductor shall be as per the IS. **d.**

Component Part

i. Air Terminal and Roof Conductors

- An Air termination shall consist of vertical conductor or a system of horizontal conductors and shall be installed along the outer perimeter of the roof.

- No part of the roof shall be more than 9 meter from the nearest horizontal protective conductor.
- All metallic projections, chimneys, ducts, vent pipe, railings, gutters etc. on or above the main surface of the roof of the structure shall be bonded to the firm part of the Air termination network. The method and nature of fixing shall be simple, solid and permanent.

ii. Down Conductor

The down conductor shall be distributed round the outside wall of the structure. Any external metal running vertically through the structure shall be bonded to the down conductor at the top and bottom. A down conductor shall follow the most direct path possible between the air terminals and the earth termination.

The size of the down conductor shall be similar to roof conductor or air termination network. Each down conductor shall be provided with a testing joint in such a position that, it is convenient for testing.

iii. Joints and bonds

The lightning protection system shall have as few joints as possible. Joints and bonds shall be mechanically and electrically effective, eg. clamped, screwed, bolted, riveted or welded. With over looping joint the length of over looping shall not be less than 25 mm. for all types of conductor. Contact surfaces shall be first cleaned then inhibited from oxidation with a suitable non-corrosive compound.

e. Earth Resistance

The resistance from any part of the lightning protection system to earth shall not exceed 1 ohm before any bonding has been affected to metal in or on a structure or to services below ground. If the value obtained exceeds the specified one then shall be reduced by adding to the number of earth electrode.

Earthing and Earth pit

All the non current carrying metal parts of the electrical installation and mechanical equipments shall be earthed properly. The cables armour and sheath, electric panel boards, lighting fixtures, ceiling and exhaust fan and all other parts made of metal shall be bonded together and connected by means of specified earthing system. An earth continuity conductor shall be installed with all the feeders and circuits and shall be connected from the earth bar of the panel boards to the conduit system, earth stud of the switch box, lighting fixture, earth pin of the socket outlets and to any metallic wall plates used. All the enclosures of motors shall be also connected to the earthing system.

a. Scope of Work

The scope of work shall cover supply, laying, installation, connecting, testing and Commissioning of:

i. Earthing station with Copper plate of size as given in BOQ.

ii. Earthing G.I / Copper strips from earthing station to equipotential bar.

iii. Earthing G.I / Copper strips / wires from equipotential bar to power panels, DBs, motors etc.

iv. Bonding of Non current carrying parts, and metallic parts of the electrical installation.

b. Standards

The following standards and rules shall be applicable:

- IS: 3043 - 1966 Code of practice for Earthing.
- Indian Electricity Act and Rules

All codes and standards mean the latest. Where not specified otherwise the installation shall generally follow the Indian Standard Code of Practice or the British Standard Codes of Practice in absence of Indian standard.

c. Type of Earthing Station Plate Earthing Stations

The Equipment neutral earthing shall be with copper plate earthing station and equipment body earthing shall be with hot dip galvanized iron earthing station.

The plate electrode shall be 600 x 600 x 3.25 mm copper plate for neutral earthing and shall be of hot dip galvanized iron plate having dimensions 600 x 600 x 6.3 mm thick for body earthing. The earth resistance shall be maintained with suitable soil treatment. The resistance of each earth station should not exceed 1 ohm. The earth lead shall be connected to the earth plate through Hot Dip G.I. bolts. The earthing conductors shall be of copper strip in case of copper earthing and hot dip galvanized iron strip in case of G.I. earthing. G.I. pipe with funnel of approved quality shall be used for watering the earthing electrodes / stations. The block masonry chamber with chequered plate shall be provided for housing the funnel and the pipe for watering the earthing electrodes / stations. The hardware and other consumables for earthing installation shall be of copper/brass in case of copper earthing and shall be hot dip galvanized iron material in case of G.I. earthing. Test link / test pit cover through chequered plate.

V. D G sets

Requirements & Design Criteria

DG Set is required to feed Backup Power Supply to the critical and sensitive load. Power supply system should be designed and engineered such that it enhances the life of the equipment / instruments / computer systems / network devices, etc. installed in the Data Center Facility. It should not under any condition harm the quality of operation of these devices / systems.

DG Set system shall ensure safe shutdown of the systems / equipments / instruments / controls in case of no-mains condition. The System shall be designed and integrated with the other Facility systems such that it provides fail safe operations of the systems under no-mains / no-power conditions and /or the abnormal operating conditions such as fire, theft, intrusion, etc.

Vendor to check and confirm the space available for installation, operation and maintenance of the DG Set system including panels, Fuel Tanks, Batteries, etc. offered. There should be an Acoustic Canopy / Hood of the appropriate size and as per the norms of the Pollution Control board to suppress the noise of the DG Set to the acceptable level. The vender should supply, install and commission the DG Set panel for DG set Start / Stop operation as per Bill of Material with suitable battery and charger.

Technical Specifications of DG Set

Diesel Engine

Engine should be MULTI cylinder, 4 stroke cycle, Water cooled developing 500 KVA at 1500 RPM under NTP conditions of BS: 5514. The engine shall be provided with electrical starting arrangement & shall give the electrical output of **500 KVA AND 400 KW** at 0.8 power factor, 415 V at the alternator terminal.

Governing performance in accordance with class-A1 as per ISO-3046, BS-5514.

Power output guaranteed within 0 to +2 % and can be operated up to 3130 Mt. altitude and no derating for Ambient temperature or humidity

Other accessories of the engine

Cooling System

- Radiator cooled / HE cooled
- Engine mounted Water pump
- Thermostats
- Corrosion Inhibitor
- Self contained piping
- Outboard after coolers **Fuel**

System

- PT fuel pump or EUI System
- STC Injectors or EUI System
- Fuel filters – Paper element type
- Self contained piping

Safety System (Engine Protection – Trip)

- Low lub oil pressure
- High water temperature
- Over speed
  - Low Coolant oil level (alarm)

Lubricating System

- Oil pump
- Strainer
- Lub oil cooler-Plate type
- Oil filter – Paper element type or Spin on Type
- Bypass filter (If required)
- Self contained piping

Air Intake System

- Dry type Paper Element filters
- Air intake manifold with necessary connections
- Turbo charged after cooled
- Restriction Indicator

Exhaust System

- Exhaust manifold
- Stainless steel flexible connections suitably optimized to reduce noise.
- Silencers **(Residential)**

Governing System

- Electronic Digital

Governor **Starting System**

- Starter, 24V, DC
- Battery charging Alternator
- With in-built Regulator

Other system

- Flywheel
- Flywheel housing

Power Command Genset Controls (Suitable for SOLO application)

The Power Command Control, should be a micro processor based generator set monitoring, metering, protection and control system. It offers advanced levels of functions for reliability and optimum Genset performance. An extensive array of integrated standard control and digital display features eliminate the need for discrete component devices such as the voltage regulator, governor control and protective relays. The control system has easy servicing capabilities that allow system parameters to be interrogated, monitored and adjusted with a PC.

Features:

- Digital Governing
- Digital voltage regulation
- AmpSentry protection for true alternator O/C protection
- Analog/ bargraph/ digital AC output metering
- Battery monitoring system to sense and warn against a weak battery condition
- Digital alarm and status message display
- Genset monitoring: displays status of all critical engine and generator set functions
- Protection : Over Voltage , Under Voltage ,Over frequency, Under frequency,
- Over current ,Reverse Power, Load Demand Relay.
- Smart starting control system: Integrated fuel ramping to limit black smoke and frequency overshoot
- Advanced serviceability

Alternator

The A.C. Generator shall be 500 KVA, 3 phase, 4 wire, 415 V, 0.8 P.F., 1500 RPM, 50 Hz Salient pole, Brush-less & Revolving field type.

Synchronous, self-excited, self-regulated,

Self- ventilated, Screen Protected Drip Proof,

2/3rd Pitch Winding,

Enclosure: IP23,

Class of Insulation 'H'

The A.C. Generator shall be Horizontal foot mounted single bearing type and shall be fitted with Automatic Voltage Regulator (AVR) for Voltage regulation of +/- 1% or

better. The AVR shall be fitted inside the Alternator terminal box and pre-wired. The A.C. Generator shall meets the requirements as per IS4722! BS5000.

Mounting

The engine & A.C. Generator described above shall be flexibly coupled, aligned and mounted on rigid M.S. Fabricated Base Frame.

Peripherals

The DG Set should be equipped with all the required peripherals for the smooth operation of the DG set, few of them are listed below:

i. Fuel Storage Day Tank Fabricated from MS Sheet Steel and shall be complete with:

- Tube Type Level Indicator
- Air vent
- Drain Outlet with dead plug
- Supply & Return Connection with isolation valves.

ii. Fuel supply & return Flexible Hose with adopter

iii. Heavy Duty Residential Silencer.

iv. Exhaust Flexible Expansion bellow!Pipe

v. 2 Nos. 12V, 180 AH Dry Prestolite Make Maintenance Batteries with:

- MS Fabricated Battery Stand
- Battery Leads

Acoustic Enclosure

Acoustic Enclosure with other accessories should meet the detailed specifications! scope of supply as under:

i. The noise emission under free field condition shall be 75 dbA at 1 mtr. distance.

ii. The Acoustic Enclosure should generally comprise ! incorporates following:

- The Structure ! Profile should be made out of export quality CRCA Sheet Steel.
- The roof, side-walls, integral partition and doors should be all sandwich design made out of export quality CRCA Sheet Steel.
- The Acoustic Enclosure should be natural cooled & maintain A t (Temp. difference with Air ambient) of 5 - 7° Cent. If need arises articulated ventilation are also considered.
- The sound absorption material should be selected from either mineral wool ! non-igniting foam of relevant thickness and density to meet the performance.
- The enclosure construction should provide sufficient access for maintenance work.
- The Enclosure should be complete with:
  - Arrangement for Power Cable connection for supply to load
  - Suction Louvers
  - Discharge Louvers
  - Openable and lockable doors with Air tight neoprene rubber gasket.
  - Interior lighting arrangement - 1 No Lamp with ON/OFF Switch on Control Panel
  - Lifting arrangements

Documents

- D.G. Set Test Certificate
- Engine Operation & Maintenance Manual
- Engine Parts Catalogue
- Alternator Operation, Maintenance & Spare Part Manual
- Alternator Test Certificate

- Control Panel AC Schematics

Essential Accessories

One set of essential accessories shall be supplied with each D.G. Set. This set of accessories shall comprise of the following:

Base Frame

One no. MS Fabricated adequately machine Channel Common Base Frame with lifting facility, pre-drilled foundation holes suitable for permanent installation on concrete foundation for direct grouting or on anti-vibration mountings which will be suitable to receive the offered engine and alternator duly coupled through a flexible coupling. A suitable coupling guard shall also be provided.

Fuel Tank

One no. Daily fuel tank of **990 LITRES** capacity for each DG set made out of 2 mm thick 14G MS sheet complete with inlet and outlet connections, drain plug, manhole, etc. & suitable for mounting on floor with mounting pedestals. Wire-braided hoses shall also be supplied with fuel tank.

Batteries

For electrical control circuit of 24 volt DC, required Nos. batteries of 12 volts 180 Ah each (dry and uncharged) of **STANDARD** make with battery leads for electrical starting of each DG Set.

Detailed Technical Specifications, codes and standards:

a. General

Scope (D.G. SET)

This specification covers the design, construction features, manufacture and performance of emergency diesel generator. The scope includes supply, installation, testing and commissioning of D.G. set along with fuel pipe line, exhaust pipe insulation etc.

Codes and Standards

The design, manufacture and performance of the diesel generator and accessories shall comply with all currently applicable statutes, regulations and safety codes in the locality where the diesel generator will be installed and with the latest applicable codes and standards. Nothing in this specification shall be construed to relieve vendor of this responsibility.

b. Design and Construction

General

The diesel engine offered shall be of the regular production models of the manufacturer for industrial applications and already type tested either at the manufacturer's works or outside. The type test report shall be furnished to the RITES for his review.

In case the proposed engine model has not been type tested, vendor shall furnish with the offer, a reference list of its existing industrial installation and at least three of these engines should have completed, 5000 hours of running at site.

Unless otherwise specified in the equipment data sheets, the diesel engine shall be provided with class A1 governing as per the latest edition of B.S. 5514. The "Cyclic irregularity" of the diesel engine for direct coupling to an electric generator, "angular deviation of A.C. generators" given by diesel engine for parallel operation, and the "engine governor speed

droop characteristics", shall be restricted to the values specified under the latest edition of B.S. 5514.

The Successful Bidder shall be responsible for carrying out torsional analysis of the dynamic system as specified in the latest edition of B. S. 5514. The results in the form of a report shall be submitted to the RITES for scrutiny and reference, if desired.

Successful Bidder shall provide the flexible exhaust connections to connect the engine exhaust to the exhaust piping. The required size of the exhaust piping should be clearly specified by the vendor. The common base plate for mounting the diesel

engine and the driven equipment as well as the flexible coupling, shall be supplied by the vendor.

Vendor shall indicate in the bid, the IS Noise Level rating of the diesel engine with the offered exhaust silencer, which should not exceed more than 95 db at 3 Mtrs. distance.

Engine Starting

Diesel engines shall be capable of starting without the use of cold starting aids so long the ambient temperature at the site is not below 4° c. Where the diesel engine is specified / offered with battery starting arrangement, the starter motor shall be capable of starting the engine without having to disengage the driven machine with the help of a clutch. Where the diesel engine is equipped with a dual starter the synchronizing switch and the corresponding wiring / connection with the starter motor shall be provided by the vendor.

In case of diesel engines driving the engine mounted battery charging alternator, the Vendor shall also provide automatic battery charging equipment suitable for taking power from supply authority's power source and mounted on a free standing type of a panel.

The battery charger as specified in the equipment data sheet, shall be capable of delivering a current equal to 100% of the 20 hour discharge rate of the battery and also equipped with charging rate selector device.

As specified in the specifications, the diesel engine is required to start / stop automatically, the vendor shall provide the necessary controls (automatic - cum - manual) in the engine panel and the interconnecting wiring and piping from the panel to the engine and starting equipment. A pilot lamp shall be provided in the line side of the starting equipment circuit to indicate that the controller is in the automatic position. In the event the engine does not start after three attempts have been made, the controller shall stop all further cranking and operate the audio-visual alarm.

Engine Cooling

Vendor shall supply complete cooling system.

Engine Fuel system

Engine fuel system shall be complete in all respects but not limited to following :

- The daily service fuel tank shall be equipped with shielded level gauge, strainer and a hand hole of not less than 150mm diameter, besides the required fuel connections and a drain plug. One tanks of 990 Liters capacity to be provided.
    - The inside surfaces of the fuel tank and the float tank shall be coated with Synthetic Enamel Red or Black or approved shades of I.C.I. or its equivalent and the outside surface to be given two coats of the oil resistant primer paint. The fuel tank shall be hydrostatically tested at a pressure not less than 0.35 Kg./Cm.^{2}
    - Electrically operated fuel oil transfer pump to transfer oil from barrels to day tank shall also be provided.
    - All piping, valves, fittings and supports inside D.G. house shall be part of supply.

c. Inspection and Testing

The representative of RITES shall have entry to the plant while and wherever work for the equipment is being performed.

The vendor shall have the responsibility of providing RITES's representative with all requisite facilities / equipment and to show satisfactory testing.

The diesel engines shall be tested in the presence of RITES's representative accordance with latest edition of B.S. 5514 or any other equipment standard as agreed to with the RITES before the finalization of order.

The routine load and fuel consumption test shall be of the 4 hours.

Unless otherwise specified, 10% overload provision shall be kept while setting the fuel stop for the site running.

The engine control panel/s after assembly and wiring, shall be functionally tested in the presence of the RITES's representative.

d. Alternator

This specification define the requirements of design, manufacture, testing and supply of self excited emergency generator complete with automatic voltage regulator, control panel, generator breaker and other accessories as specified in the material requisition.

Unless otherwise specified the emergency generator shall be supplied complete with :

- Brush less excitation system complete with AVR.
- Electric panel including control cubicle and associated auxiliary devices, relay panel and generator breaker battery and charger.
- Air inlet and outlet for generator cooling.
- Lifting arrangement for the machine.
- Foundation frame complete with foundation bolts and base frame.
- Lube oil system integral with the prime mover lube oil system.
- Spares for commissioning
- Spares for two years of operation and maintenance.
- Any other part / accessories not specifically mentioned above but considered necessary for safe and reliable operation.

e. Codes and Standards

Unless they are in variance with the clause of this specification the diesel engine driven generator and their components shall comply with the latest edition of the applicable standards listed below:

IS :2253 Designation for type of construction and mounting arrangement of rotating electrical machines.

IS: 4691 Degree of protection providing by enclosures of rotating electrical machinery.

IS : 4728 Terminal marking of rotating electrical machines.

IS : 7132 Guide for testing 3 Ph. Synchronous Machines.

IS : 5422 Turbine type generators.

IS : 4889 Methods of determination of efficiency of rotating electrical machines.

IS : 1271 Insulating materials for Electric machinery and apparatus in relation to their thermal stability service, classification.

IS : 4722 Specification for rotating electrical machines.

IS : 2516 A.C. circuit breakers.

f. Design and Construction

The alternator design shall meet the requirement specified in data sheet and shall be suitable for the site conditions specified therein. The alternator shall be mounted on a common base frame together with the rime mover unless otherwise agreed. The generator shall be provided with necessary lifting hooks and two earth terminals for connection to main earth grid. The alternator winding shall be class "H/F" insulation with temperature limitation.

The stators windings shall be brought out to six insulated terminals in two separate terminal boxes. The alternator shall therefore, be provided with three separate terminal boxes. The alternator shall, therefore, be provided with three separate terminal boxes i.e. for the line and neutral stator connection and for control connection. The terminal box for the line terminal shall have sufficient space for the termination of cable size specified in data sheet. The neutral box shall be in addition to the space for neutral earthing cable shall have sufficient room for the current transformers used for the protection of the generator. Star connection shall be formed in the neutral side of terminal box. The terminal box for control cable shall contain properly marked terminals for all internal equipments e.g. embedded temperature

detectors etc. All terminals shall be stud type. The terminal boxes shall be complete with lugs and double compression type cable glands. Current transformers shall be as specified in data sheet.

All parts and accessories shall be suitable to withstand stresses due to over speed / overload / short circuit conditions specified.

Bearings shall be double shielded and pre-lubricated. Grease in the bearing enclosure shall provide additional lubrication to bearings as well as provide sealing against dust and moisture.

The alternator shall be air cooled unless otherwise agreed; alternator enclosure shall be as specified in data sheet.

The direction of rotation of the rotor of the machine shall be compatible with that of the prime mover. A clear indication of the direction of rotation shall be given on either end of the machine.

Space heaters shall be installed within the enclosure, location and max. surface temperature of the heaters shall be such that no damage can be caused to any insulation. Heaters shall suitable for operation on a single phase 240v AC supply unless otherwise specified. A suitable double pole switch shall be mounted on or adjacent to the stators frame or enclosure for the manual switching off of the heaters.

Field winding shall have class "H" insulation with excellent electrical and mechanical properties. The field winding shall be capable of operating at a field voltage of 125% of rated load field voltage for at least one minute starting from stabilized temperatures at rated conditions.

A rating plate of corrosion resistant material shall be fixed on the generator frame and shall give the following information:

- Manufacturer's name.
- Serial Number, Type and frame reference
- Rated output in KVA & KW
- Rated power factor, frequency and voltage
- Rated stators current and speed in Rev. / Min.

- Class of insulation
- Phase rotation (CW or CCW)
- Customer's indent no.
- Year of manufacture
- Weight rotor and stators in Kg.

g. Excitation System

The generator shall be provided with brush less type solid state excitation system with automatic voltage regulator. The excitation system shall include the automatic

voltage regulator, AC exciter and rotary rectifier. The field of the exciter shall be fed from the stators winding through a suitable transformer and AVR. AC voltage generated in the AC exciter shall be rectified by the rotary rectifier assembly and fed to the main field circuits. The rotor windings of the AC exciter, the rectifier assemble, main field winding of the generator and other accessories on rotor part shall be rigidly fastened to the shaft and the connection with different items shall be anti-loosening type.

The exciter capacity shall be at least 20% more than the maximum requirement at any time. The exciter winding shall be insulated with class "F" insulation.

Automatic solid state voltage shall be provided with the following features as a minimum.

- Under frequency protection.
- Short circuit protection.
- Manual voltage control switches with adjuster.
- Cross current compensation for parallel operation.
- Voltage build up circuitry.
- Stators current limiter.
- Field current limiter.

The current and potential transformers required to feed the AVR from the generator terminal shall be adequately rated.

h. System Operation

The emergency generator set shall normally be in an unattended area. The control system shall operate in fail safe mode and shall include all controls and protection necessary for the safe operation of the package. The generator set shall function as per one of the following schemes:

- Manual start in service mode.
- Manual test mode.

i. Engine Control Panel

The local generator control panel for the generator set shall comprise of the following unless otherwise specified in the attached specifications.

- Automatic voltage regulator.
- Metering equipments.
- Indicating instruments.

Any other accessory required to make the generator set operational as a package shall be included in scope of supply. If required the generator control panel shall be split into various functional sections vi. protection, metering and control, regulation etc.

The panel shall be free standing, metal enclosed, dust and vermin proof type with a hinged door and having a degree of protection IP 51 as per IS : 2147 unless otherwise specified. Power and control equipment shall be segregated inside the panel as far as practicable. The maximum height of the operation handle! switches shall not exceed 1000 mm. and the minimum height not below 300 mm. All hardware shall be corrosion resistant and bolts, nuts and washers shall be made of galvanised zinc passivated of cadmium plated high quality steel. Unless otherwise specified the panel shall be suitable for bottom cable entry. Necessary glands shall be provided with the panel.

All auxiliary devices for control, indicator, measurement and alarm such as push buttons control ! selector switches, indicating lamps, metering instruments, annunciations etc. shall be mounted on the front door of the panel. Adequate number of potential free contacts shall be provided in the control panel for any remote control, monitoring of the generator set.

All switches shall be load-break, heavy duty type. All fuses shall be non-deteriorating HRC cartridge pressure fitted, link type. The contractor shall be air-break type having AC-3 duty rating. Thermal overload relays shall be three element, positive acting, ambient temperature compensated type with adjustable setting range and built in protection feature against single phasing. All indicating instruments shall be moving iron, flush mounting type and of 96 mm. x 96 mm. square pattern. All control ! selector switches shall be rotary back connected type having a cam-operated contact mechanism with knob type handle. “STOP” push buttons shall be stay put type.

Wiring for power, control and signaling circuits shall be done with PVC insulated copper conductors having 660 ! 1100 V grade insulation. Minimum size of control wires shall be 1.5 mm. ‘ELEMEX” type terminals shall be acceptable for wires up to 10 $mm.^2$ size and for conductors larger than 10 $mm.^2$ bolted type terminals with crimping lugs shall be provided. A minimum of 10% spare terminals shall be provided on each terminals block.

An adequately sized earth bus shall be provided in the panel for connection to the main earth grid. All non current carrying metallic parts of the mounted equipments shall be earthed. Doors and movable parts shall be earthed using flexible copper connections.

Engraved nameplates shall be provided for all devices mounted on the front of the panel. Name plate or polyester adhesive stickers shall be provided for each equipment mounted inside the panel.

j. Painting, Packing and Transport

All metal surfaces shall be thoroughly cleaned of scale, rust and grease etc. prior to painting. Cleaned surfaces shall be given two coats of primer and prepared for final painting. Final finish shall be free from all sorts of blemishes. The equipment shall be shipped to site suitably packed to prevent any damage. Each package shall have labels to show RITES’s name, purchase order and equipment no. suitable lifting lugs etc. shall be provided and lifting points shall be clearly marked on the package. Packing shall be suitable for storage at site for a minimum period of 6 months.

k. Test and Inspection

The RITES or his authorized representative may visit the works during manufacture of equipment to assess the progress of work as well as to ascertain that only quality raw materials are used for the same. He shall be given all assistance to carry out the inspection. Detailed test procedure along with the facilities available at vendors works shall be furnished along with the bid Owner’s representative shall be given minimum four weeks advance notice for witnessing the final testing. Test certificates including test records and performance curves etc. shall be

furnished by the complete D.G. , individual test certificates of engine / alternator / common panel should be submitted, only thereafter complete D.G. would be tested.

All tests to be done by vendor at its own cost. Equipment shall be tested to conform to the appropriate standards and the following tests shall be conducted:

- Functional tests, continuity tests and high voltage test on control panel to establish the performance called for in the specification.
- Power frequency voltage test on switch gear and mechanical / electrical operational check
- Certificate for routine Tests of alternator
- Over speed test (1.2 times the rated speed for 2 minutes)
- Transient response tests for sudden application and rejection of loads at various load from 0 to 110 %.
- Phase sequence test.
- Vibration test
- Noise level test
- Dimensional and alignment test.
- Wave from test
- String test
- Block loading test
- Fuel Consumption and voltage, amp, frequency response test at various load (At various load from 0 % to 110 %)

Specifications for Diesel Generator Set

1.0	Prime Mover	Diesel Engine
2.0	Quantity Required	One No for each alternator
3.0	Service	Prime mover for generator set
4.0	Horse Power	As per schedule of quantity
5.0	RPM	1500
6.0	Flywheel	Required
7.0	Vibration Damper	Required (Fuel Type only)
8.0	Fuel Pump air cleaner	Required
9.0	Fuel Pump	Required
10.0	Oil filter, Fuel filter etc	Required
11.0	Lub Oil Pump	Required
12.0	24 V DC Electrical System	Required
13.0	Safety Control	Required
14.0	Residential Type Silencer	Required
15.0	Coupling	Required

16.0	Instrument Panel Consists of a) Starter Switch with Key b) Lub Oil Temp guage c) Water temp. guage d) Lub Oil pressure	 Required Required Required Required Required
17.0	Fuel Tank	Required
18.0	Battery charger	Required
19.0	Engine Testin a) At site b) At shop	 Required Required
20.0	Tool Kits	Required
21.0	Literature (2 set with each) a) Operation & Maintenance Manual	 Required Required

i. he engine H.P. should be selected so as to achieve required KW rating to be geTenrated at site condition considering no deration.

ii. D.G. set should be able to start by push button starting or upon receiving the command from Main panel in Auto mode..

iii. The engine test shall be witnessed by the client's representative.

iv. The engine should have automatic belt tensioning arrangement for battery charging alternator system.

v. The engine should have facility for the oil level in oil sump during running of the engine.

vi. The engine should be fitted with sump oil drain pump fitted on the engine itself.

vii. The noise level should not be more than 95 db at 3 Mtrs. distance and engine exhaust smoke emission level should be less than 1 bosch.

viii. Engine should be preferably from the engine manufacturers who maintain quality - assurance to international standard of ISO 9001.

ix. Engine should be fitted with electronic governor only.

x. The engine water circular pump should be directly driven by engine gear system. V-belt driven system should not adopt / accepted.

VI **TECHNICAL SPECIFICATIONS OF UPS FOR ZONE A :**

This specification describes the operation and functionality of a continuous duty, three-phase, solid-state, static Uninterruptible Power System (UPS) hereafter referred to as the UPS. The UPS shall utilize a 2(N) redundant, scalable architecture. The system power train shall be comprised of hot swappable / user replaceable UPS and battery modules of the same make , which shall operate in parallel, and be configured for N+1 redundant operation at rated load. Each UPS module contains a full rated input rectifier / boost converter (hereafter referred to as Input Converter), full rated output inverter, and 10% battery charging circuit. The system shall also comprise of a user-replaceable continuous duty bypass static switch module, hot swappable / user replaceable battery modules, redundant control modules, redundant logic power supplies, and LCD interface display. System static switch shall be capable of being fed from the same input as the rectifier or a separate input. All of the above system components are housed in two EIA-310D standard

equipment racks. 3 phase, 400 V power modules of min. 15 KVA = 15 KW with self- testing capability with connected to the main power frame. Power modules connecting to the AC power bus should have CAN (Controlled Area Network) bus for communications and logical control Active Harmonics Filter is essential and shall be built in the system. Active Power Factor Correction shall be built in to the power modules.

S/no	Detailed Technical Specifications – Uninterrupted power supply units.	Complied, Yes/No
A	**BASIC INPUTS**	
1	Make	
2	Model	
3	System capacity- 30kVA or 30 KW Minimum	
4	Type of redundancy- 2 N	
5	Backup time- 30 Min on each set of ups on full load.	
B	**GENERAL SPECIFICATIONS**	
1	This specification describes the operation and functionality of a continuous duty, three-phase, solid-state, on-line double conversion static Uninterruptible Power System (UPS) hereafter referred to as the UPS. The UPS shall utilize a rack-mounted N+1 redundant, scalable array architecture.	
2	Each ups modules contains a full rated input rectifier / boost converter (hereafter referred to as Input Converter), full rated output inverter (KVA =KW), and battery charging circuit.	
3	The system shall also comprise of a user-replaceable continuous duty bypass static switch module	
4	The system shall also comprise of a user-replaceable hot swappable battery modules, which can be swapped with out switching of the ups modules when required.	
5	The system shall also comprise of redundant main controller modules, redundant logic power supplies, which can be swapped with out switching off any ups modules when required.	

S/no	Detailed Technical Specifications – Uninterrupted power supply units.	Complied, Yes/No
6	The UPS manufacturer should provide an output distribution system to distribute quality uninterrupted power for mission critical, data centre load. This distribution system should be installed out side the ups modules along with input, output & manual bypass switches in a metal enclosure which is in a rack form factor. Out put distribution should happen through 3phase & neutral bus-duct.	
7	The ups units & the batteries shall be scalable with out shutting down the mission critical Data Centre load.	
C	**MODES OF OPERATIONS**	
1	**Normal:** The input converter and output inverter shall operate in an on-line manner to continuously regulate power to the critical load. The input and output converters shall be capable of full battery recharge while simultaneously providing regulated power to the load for all line and load conditions within the range of the UPS specifications.	
2	**Battery:** Upon failure of the AC input source, the critical load shall continue being supplied by the output inverter, which shall derive its power from the battery system. There shall be no interruption in power to the critical load during both transfers to battery operation and retransfers from battery to normal operation.	
3	**Recharge:** Upon restoration of the AC input source, the input converter and output inverter shall simultaneously recharge the battery and provide regulated power to the critical load.	
4	**Static Bypass:** The static bypass shall be used to provide controller transfer of critical load from the inverter output to the bypass source. This transfer, along with its retransfer, shall take place with no power interruption to the critical load. In the event of a UPS output fault or significant output overload emergency, this transfer shall be an automatic function. Manual transfer to Static Bypass (called "Requested bypass") shall be available in order to facilitate a controlled transfer to Maintenance Bypass	
5	**Maintenance Bypass:** The system can be equipped with an optional integrated, bus connected external make-before-break Maintenance Bypass Cabinet to electrically isolate the UPS during routine maintenance and service of the UPS. The make-before-break Maintenance Bypass Cabinet shall allow for the completely electrical	

S/no	Detailed Technical Specifications – Uninterrupted power supply units.	Complied, Yes/No
	isolation of the UPS. An option for an external make-before-break external maintenance bypass panel shall be available	
D	**SYSTEM CHARACTERISTICS.**	
1	System Capacity: The system shall be rated for full kW output.	
2	UPS Input	
2.1	AC Input Nominal Voltage: 230 V, 3 Phase, 4 wire + G, 50 Hz.	
2.2	AC Input Voltage Window: 340 - 460VAC (while providing nominal charging to the battery system).	
2.3	Maximum Frequency Range: 40-70Hz	
3	**Input Power Factor:**	
3.1	Greater than 0.99 with load at 100%	
3.2	Greater than 0.99 with loads above 50%	
4	**Input Current Distortion:**	
4.1	Input current Distortion with no additional filters: less than 5%	
5	**Soft-Start:**	
5.1	Shall be linear from 0-100% input current and shall not exhibit inrush. This shall take place over a user selectable 1- 60 second time period with a factory default of 10 seconds.	
6	**UPS OUTPUT.**	
6.1	AC Output Nominal Output: 230V, 3 Phase, 4 wire + G, 50 Hz.	
6.2	AC Output Voltage Distortion: Less than. 2% @ 100% Linear Load. Less than 6% for SMPS load as defined by EN50091-3/IEC 62040-3.	

S/no	Detailed Technical Specifications – Uninterrupted power supply units.	Complied, Yes/No
6.3	AC Output Voltage Regulation: +/- 1% For 100 % Linear or Nonlinear Load	
6.4	Voltage Transient Response: +/-5% maximum RMS change in a half cycle at load step 0% to 100% or 100% to 0%.	
6.5	Voltage Transient Recovery within <50 milliseconds	
6.6	**Output Voltage Harmonic Distortion:**	
6.6.1	<2% THD maximum and 1% single harmonic for a 100% linear load	
6.7	**Phase Angle Displacement:**	
6.71	120 degrees +/-1 degree for balanced load	
6.7.2	120 degrees +/-1 degrees for 50% imbalanced load	
6.7.3	120 degrees +/-3 degrees for 100% imbalanced load	
6.8	**Overload Rating : Normal Operation:**	
6.8.1	150% for 30 seconds before transfer to Bypass	
6.8.2	125% for 10 minutes before transfer to bypass	
6.9	**Overload Rating : Bypass operation**	
6.9.1	125% continuous	
6.9.2	1000% for 500 milliseconds	
6.10	**System AC-AC Efficiency:**	
6.10.1	Normal operation > 96% at 40% - 100% load Battery operation > 96% at 40% to 100% load	
6.11	**Output Power Factor Rating:**	

S/no	Detailed Technical Specifications – Uninterrupted power supply units.	Complied, Yes/No
6.11.1	0.5 leading to 0.5 lagging without any derating	
6.12	**Battery Protection:**	
6.12.1	The inverter shall be provided with monitoring and control circuits to limit the level of discharge on the battery system.	
E	**CHARGING**	
1	The battery charging shall keep the DC bus float voltage at +/-1% of tolerance	
2	The battery charging circuit shall contain a temperature compensation circuit, which will regulate the battery charging to optimize battery life.	
3	The battery charging circuit shall remain active when in Static Bypass and in Normal Operation	
F	**BATTERIES**	
1	The UPS battery shall support an optional battery plant of modular construction made up of user replaceable, hot swappable, fused, battery modules. Each battery module shall be monitored for voltage and temperature for use by the UPS battery diagnostic. Battery charging current shall be temperature compensated.	
2	The battery jars housed within each removable battery module shall be of the Valve Regulated Lead Acid (VRLA) type.	
3	The UPS shall incorporate a battery management system to continuously monitor the health of each removable battery module. This system shall notify the user in the event that a failed or weak battery module is found.	
4	The Batteries shall be long life batteries (5-8year) and the battery casing shall be flame retardant type.	
G	**SOFTWARE AND CONNECTIVITY**	
1	Network Adaptor: The Ethernet Web/SNMP Adaptor shall allow one	

S/no	Detailed Technical Specifications – Uninterrupted power supply units.	Complied, Yes/No
	or more network management systems (NMS) to monitor and manage the UPS in TCP/IP network environments. The management information base (MIB) shall be provided in DOS and UNIX "tar" formats.	
2	Unattended Shutdown -The UPS, in conjunction with a network interface card, shall be capable of gracefully shutting down one or more servers when the UPS is operating from the battery and available runtime has reached a user defined level.	
3	Web Monitoring: Remote monitoring shall be available via a web browser such as Internet Explorer.	
4	Simple Network Management Protocol (SNMP): Remote UPS Monitoring shall be possible through a standard MIB II compliant platform	
H	**DISPLAY AND CONTROLS**	
1	Control Logic: The UPS shall be controlled by two fully redundant, user replaceable / hot-swappable Intelligence modules (IM). These modules shall have separate, optically isolated, communication paths to the power and static switch modules. Logic power for the control modules shall be derived from redundant power supplies, each having a separate AC and DC input and output. The communication of the control modules shall be of Controller Area Network (CAN Bus) and EIA485	
2	Graphical User Interface: A microprocessor controlled user interface/display unit shall be located on the front of the system. The display shall consist of color graphical display with 800x600 resolution.	
3	Metered Data: the following data shall be available on the Graphical User Interface/display: Input\Output Voltages, Currents, Frequencies, Breaker & Switch Status, Battery Status, Event Log	
4	Event log: The display unit shall allow the user to display a time and date stamped log.	
5	Controls: All the ups controls or programming functions shall be accomplished by use of the display unit. The touch screen display shall facilitate these operations	

S/no	Detailed Technical Specifications – Uninterrupted power supply units.	Complied, Yes/No
I	**REMOTE MONITORING**	
1	Web Monitoring: Remote monitoring shall be available via a web browser such as Internet Explorer.	
2	RS232 Monitoring: Remote UPS monitoring shall be possible via either RS232 or contact closure signals from the UPS.	
3	Simple Network Management Protocol (SNMP): Remote UPS Monitoring shall be possible through a standard MIB II compliant platform.	
4	The UPS manufacturer shall have available software to support graceful shutdown and remote monitoring	
J	**ENVIRONMENTAL**	
1	Storage Ambient Temperature: -15 to 40C	
2	Operating Ambient Temperature: 0°C to 40°C	
4	Relative Humidity: 0 to 95% Non-condensing	
5	Altitude: Maximum installation with no derating of the UPS output shall be 3,000 feet (1000m) above sea level	
K	**FACTORY ASSISTED START-UP & MAINTENANCE**	
1	If a factory assisted UPS start-up is requested, factory trained service personnel shall perform the following inspections, test procedures, and on-site training:	
2	On-Site Operational Training: During the factory assisted start-up, operational training for site personnel shall include touch screen operation, LED indicators, startup and shutdown procedures, maintenance bypass and AC disconnect operation, and alarm information.UPS Manufacturer should have minimum 3 manufacturing plants in India and should have minimum 25 similar installations in India.	
3	The UPS manufacturer shall have a nationwide service organization	

S/no	Detailed Technical Specifications – Uninterrupted power supply units.	Complied, Yes/No
	Available, consisting of manufacturer trained field service personnel to perform start-up, preventative maintenance, and service of the UPS system and power equipment. The service organization shall offer 24 hours a day, 7 days a week, 365 days a year service support in all class A cities & next day business in all class B & C cities. A Toll free number is required for services .	
4	Replacement parts: Parts shall be available through the nationwide service organization 365 days a year. The nationwide service organization shall be capable of shipping parts / modules any where in India with in stipulated time required by RITES. RITES will not allow any component level repairs in Data Center ups systems inside the DC / Equipment room / ups room.	
L	**STANDARDS**	
1	ISO 9001	
2	ISO 140001	
M	**DELIVERY SUBMITTALS**	
1	Installation manual, which includes instructions for storage, handling, examination, preparation, installation, and start-up of UPS.	
2	User manual, which includes operating instructions.	

UPS FOR other auxillary load should be double conversion high efficiency online UPS of 20 KVA X 2 numbers in parallel mode with 30 minutes back up time each.

VII. Precision Air Conditioning (PAC)

Cooling

a) Air-conditioning units shall be designed to achieve the specific environmental operating requirements published by the OEMs. The design shall ensure that their devices will function properly by maintaining the minimum and maximum operating temperature at the server intake, and the quantity of airflow measured in CFM required at the server's intake.

b) Bypass of airflow (conditioned air supplied from the precision air conditioning units is delivered directly back to the air conditioner's intake) like penetrating of air through cable cut-outs, holes under enclosures, or misplaced perforated tiles etc shall be completely blocked.

c) Air leakage through holes/windows in the computer room perimeter walls and non-sealed doors shall be avoided. Proper sealing of computer room shall be mandatory.

d) Recirculation of air (hot air exhausted from the rack-mounted computing device is fed back in to its own intake) shall be competed avoided. The vendor shall submit the airflow analysis or CFD analysis to support their layout being designed will avoid all kinds of recirculation of air from top of the rack or through the vacant U space inside the racks.
e) Design shall based on the latest design technologies like closed coupled cooling with in row based units to minimize the recirculation of air to avoid potential overheating and damage to computing equipment which may result disruption to mission-critical services in the data center.
f) Air stratification (layering effect of temperature from the bottom to the top of the enclosure) shall be completely avoided in proposed design.
g) Positions of Indoor units shall be done wisely to reduce the distance of return air path from hot aisle to hot-air in-take of cooling units. Cooling units shall be positioned as closer to the heat load, so that any kind of recirculation of air can be avoided. Also horizontal air-flow in the front of the racks should ensure uniform CFM cross the entire face of the racks.
h) Servers located at the highest points of a high density enclosure shall receive the required amount CFM calculated based on Delta T.
i) Temperature available across the entire face of sever enclosures shall maintain with in minimum and maximum operating temperature & relative humidity range.

Cooling with accessories

Design shall based on the latest design technologies like closed coupled cooling with in row based units to minimize the recirculation of air to avoid potential overheating and damage to computing equipment which may result disruption to mission-critical services in the data center.

Air stratification (layering effect of temperature from the bottom to the top of the enclosure) shall be completely avoided in proposed design.

Positions of Indoor units shall be done wisely to reduce the distance of return air path from hot aisle to hot-air in-take of cooling units. Cooling units shall be positioned as closer to the heat load, so that any kind of recirculation of air can be avoided.

Servers located at the highest points of a high density enclosure shall receive the required amount CFM calculated based on Delta T.

Temperature available across the entire face of sever enclosures shall maintain with in minimum and maximum operating temperature & relative humidity range.

S/no.	Detailed Technical Specifications – **Cooling with accessories**	Complied, Yes/No	Deviations if any.
A	SUMMARY- The environmental control system shall be designed specifically for precision Temperature control applications. It will automatically monitor and control cooling and filtering functions for the conditioned space. The system shall be built to the highest quality engineering and manufacturing standards, and shall be floor mounted and configured for horizontal airflow, with draw-through air pattern, to provide uniform air distribution over the entire face of the coil.		
1	Make		

2	Model		
3	System capacity- Aprox 10 kW		
4	Type of redundancy- N+1		
5	Qty- 3 nos		
B	General Specifications.		
1	Units shall be 42 U, half rack width & include casters and leveling feet to allow ease of installation in the row and provide a means to level the equipment with adjacent IT racks.		
2	Front and rear exterior panels shall be 18 gauge perforated steel with 69.5% open free area, and equipped with a keyed lock to provide a means of securing access to the internal components of the unit.		
3	Exterior panels shall be 18 gauge steel with 80 kg/m3 (5 lb/ft3) density foam insulation. Insulation complies with UL94-5VA ASTM E84 flame spread and smoke developed rating of 25/50.		
C	FANS		
1	Fans: The unit shall be configured for draw-through air pattern to provide uniform air flow over the entire face of the coil. Each unit shall include six 200 mm mixed flow direct drive DC axial fans. Each fan assembly should be designed to provide 180.1 l/s (381.7 CFM) for total unit airflow of 1080.76 l/s (2290 CFM). The ACRD500 series includes two fans. Each fan provides 1085.5 l/s (2300 CFM) for a total unit airflow of 2171 l/s (4600 CFM).		
2	Variable Speed Fans: Variable speed fans: Fans shall be variable speed capable of modulating from 30-100%. Fans shall soft start to minimize in-rush current.		
3	Fan protection: Each fan assembly shall consist of a plastic injection molded bezel with integral fan discharge finger guard. Inlet of the fan should include a cage type finger guard.		
4	Operation and Service: The unit should be capable of operation in the event of a fan failure. Fans shall be replaceable while the unit is in operation.		
D	POWER SUPPLY		
1	The unit shall be provided with thermal-magnetic circuit breakers with interrupt capacity ratings per UL489/CSA C22.2/IEC-947.		
2	Units shall include a main disconnect switch located on the electrical panel in order to disconnect the power input.		
3	A condenser disconnect shall be field-supplied.		

E	MICROPROCESSOR Controller		
1	Monitoring and configuration: The display interface shall allow monitoring and configuration of the air conditioning unit through a menu-based control. Functions include status reporting, set-up, and temperature set points. Four LEDs report the operational status of the connected air conditioning unit.		
2	Controls: The microprocessor controller shall come equipped with control keys to allow the user to navigate between menus, select items, and input alpha numeric information.		
F	Network Management Card		
	The unit shall include a Network Management Card to provide management through a computer network through TCP/IP. Management through the network should include the ability to change set points as well as view and clear alarms.		
G	ALARMS		
1	Alarms: The microprocessor controller shall activate a visible and audible alarm in the occurrence of the following events:		
	a Cool Fail		
	b Air filter clogged		
	c Return air sensor fault		
	d Supply air sensor fault		
	e Rack temperature sensor fault		
	f High discharge pressure		
	g Low suction pressure		
	h Fan fault		
	i Water detected		
	j Condensate pump fault		
	k Air filter run hours violation		
	l Group communication fault		
	m Supply air high temperature violation		
	n Return air high temperature violation		
	o Filter DP sensor failure		
	p Suction pressure sensor failure		
	q Discharge pressure sensor failure		
	r Persistent high discharge pressure fault		

	s Rack inlet temperature high violation		
	t External communication fault		
	u Internal communication fault		
	v On standby input contact fault		
	w A-link isolation relay fault		
	x Excessive compressor cycling		
	y Condensate pan full		
	z Upper fan power supply fault		
H	Condensate Pump		
1	Dual factory installed and wired condensate pumps shall pump at 9.8 l/h (2.6 g/hr) at 4.9 m (16 ft) of head. Each pump shall have dual internal floats.		
I	Filters		
1	The standard filters shall be 20% efficient per ASHRAE 52.1, MERV 1 per ASHRAE 52.2, 1/2 in washable mesh filter.		
2	The optional filter shall be high capacity 2 in pleated, UL 900 Class 2, moisture resistant, with average atmospheric dust spot efficiency of 30%, per AHRAE Standard 52.1, MERV 8 per ASHRAE 52.2.		
J	Temperature Sensors		
1	Internal Temperature Sensors: Thermistor temperature sensors shall be mounted behind the front and rear doors to provide control inputs based on supply and return air temperature. Sensor accuracy shall be within ± 1 degree F accuracy.		
2	Remote Temperature Sensors: One remote rack inlet temperature sensor shall be shipped with the unit to provide control input based on rack inlet temperature.		
K	Bridge Power Cable Trough		
1	An overhead power distribution bridge, that sits between adjacent NetShelter racks and allows for removal of the unit without disrupting the overhead power cabling, is available as an accessory.		
2	Cable trough shall be constructed of 16 gauge cold rolled steel with a black powder coat finish.		
L	Bridge Data Partition		

1	An overhead cable distribution, that sits between adjacent NetShelter racks and allows for removal of the unit without disrupting overhead cabling, is available as an accessory.		
2	Data partition shall be constructed of 16 gauge cold rolled steel with a black powder coat finish.		
M	Accessories		
1	Required accessories along with out door units		

VII. Comfort Air Conditioning Split System Air Conditioners

Split AC should be sleek and can be mounted in any place. The Split AC Indoor and Out door unit shall be supplied with suitable mounting stands. The refrigerant piping, drain piping and cable between indoor and out door should be a considered while quoting. The installation and commissioning cost should include the mounting and erection of the outdoor and indoor unit with stand and suitable strengthening such as brick work, anchor fasteners, screws etc.

The auto controls should be offered in split air conditioners:

Auto Timers: With the help of this functionality the system will turn on or off according to the time have been set.

Auto Sleep Mode: This feature reduces the cooling effect during the night automatically once you have set it. With the automatic setting one should be comfortable without chilling in the night / lower ambient temperature and the lower the energy consumption.

Auto Restart: This feature will allow the system to restart in the same mode after a power failure.

Remote Controls: The split air conditioner should be supplied with a remote control. With the help of this the user can access and change the settings from several feet's distance.

Key factors to consider Size: The size of the room is an important factor to determine the size of the air conditioner. The dimensions of the air conditioner should be those that suit and fit the room.

Price: The final price should also take into consideration the cost of installation. As mentioned earlier the installation cost including erection of indoor and out door unit, piping, cabling, leakage test, gas charging etc.

Cooling Capacity: The AC should be capable to deliver the same performance even if the out side temp is 45 Deg Centigrade

Noise: Generally indoor units that do not produce much noise are preferred. In case of outdoor unit care should be taken to ensure that it is well packed so that it does not create a racket with its loose vibrating covers.

The ratio of air conditioner's cooling capacity to its power consumption is the unit's (EER). A system with higher unit is preferred so that it consumed less energy.

VIII. Intelligent Fire Detection System Addressable Fire Detection

System

a. Description

i. This section of the specification includes the furnishing, installation, connection and testing of the microprocessor controlled, intelligent reporting fire alarm equipment required to form a complete, operative, coordinated system. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, Fire Alarm Control Panel (FACP), auxiliary control devices, annunciators, and wiring.

ii. The fire alarm system shall comply with requirements of NFPA (National Fire Protection Association) Standard 72 for Protected Premises Signaling Systems except as modified and supplemented by this specification. The system shall be electrically supervised and monitor the integrity of all conductors.

iii. The FACP and peripheral devices shall be manufactured 100% by a manufacturer (or division thereof).

iv. The system and its components shall be Underwriters Laboratories, Inc. listed under the appropriate UL testing standard as listed herein for fire alarm applications and the installation shall be in compliance with the UL listing.

b. Scope

i. A new intelligent reporting, microprocessor controlled fire detection system shall be installed in accordance to the specifications as detailed in the tender document / RFP.

ii. Basic Performance:

Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on NFPA Style 6 (Class A) Signaling Line Circuits(SLC)

Initiation Device Circuits (IDC) shall be wired Class A (NFPA Style D) as part of an addressable device connected by the SLC Circuit. Notification Appliance Circuits (NAC) shall be wired Class A (NFPA Style Z) as part of an addressable device connected by the SLC Circuit. On Style 6 or 7 (Class A) configurations a single ground fault or open circuit on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm. Alarm signals arriving at the FACP shall not be lost following a primary power failure (or outage) until the alarm signal is processed and recorded.

iii. Basic System Functional Operation

When a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur: The system alarm LED on the system display shall flash. A local piezo electric signal in the control panel shall sound. A backlit LCD display shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises. Printing and history storage equipment shall log the information associated each new fire alarm control panel condition, along with time and date of occurrence. All system output programs assigned via control-by-event interlock programming to be activated by the particular point in alarm shall be executed, and the associated system outputs (notification appliances and/or relays) shall be activated.

c. Submittals

General : Two copies of all submittals shall be submitted to the Owner's authorised official for review. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality. Equivalent compatible UL-listed equipment from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met. For equipment other than that specified, the

contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

Shop Drawings: Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications. Include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts. 3 Show annunciator layout, configurations, and terminations.

Manuals: Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets. Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

Software Modifications : Provide the services of a factory trained and authorized technician to perform all system software modifications, upgrades or changes. Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site.

d. Applicable Standards and Specifications

The specifications and standards listed below form a part of this specification. The system shall fully comply with the latest issue of these standards, if applicable.

i. National Fire Protection Association (NFPA) - USA:

- No. 12 CO2 Extinguishing Systems (low and high)
- No. 12B Halon 1211 Extinguishing Systems
- No. 3 Sprinkler Systems
- No. 13A Halon 1301 Extinguishing Systems
- No. 15 Water Spray Systems
- No. 16 Foam/Water Deluge and Spray Systems
- No. 17 Dry Chemical Extinguishing Systems
- No. 17A Wet Chemical Extinguishing Systems
- Clean Agent Extinguishing Systems
- No. 72 National Fire Alarm Code
- No. 101 Life Safety Code

ii.Underwriters Laboratories Inc. (UL) - USA:

- No. 268 Smoke Detectors for Fire Protective Signaling Systems
- No. 864 Control Units for Fire Protective Signaling Systems
- No. 268A Smoke Detectors for Duct Applications
- No. 521 Heat Detectors for Fire Protective Signaling Systems
- No. 464 Audible Signaling Appliances
- No. 38 Manually Actuated Signaling Boxes
- No. 346 Waterflow Indicators for Fire Protective Signaling Systems
- No. 1076 Control Units for Burglar Alarm Proprietary Protective Signaling systems.

- No. 1971 Visual Notification Appliances

iii. Local and State Building Codes

iv. All requirements of the Authority Having Jurisdiction (AHJ) e.

Approvals

i.The system shall have proper listing and/or approval from the following nationally recognized agencies:

- UL Underwriters Laboratories Inc
- FM Factory Mutual

ii.The fire alarm control panel shall meet UL Standard 864 (Control Units) and UL Standard 1076 (Proprietary Burglar Alarm Systems).

iii.The system shall be listed by the national agencies as suitable for extinguishing release applications. The system shall support release of high and low pressure CO2.

f. Products

i) Equipments and Material

- All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protective signaling system, meeting the National Fire Alarm Code.
- All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.
- All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

ii) Conduit and Wire

- **Conduit:** Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements. Where required, all wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit. Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760-29.

Wiring for 24 volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals. Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer. Conduit shall be 3/4-inch (19.1 mm) minimum.

- **Wire :** All fire alarm system wiring shall be new. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as

recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for Initiating Device Circuits and Signaling Line Circuits, and 14 AWG (1.63 mm) for Notification Appliance Circuits.

All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in NFPA 70 (e.g., FPLR). Wiring used for the multiplex communication circuit (SLC) shall be twisted and unshielded and support a minimum wiring distance of 12,500 feet. The design of the system shall permit use of IDC and NAC wiring in the same conduit with the SLC communication circuit.

All field wiring shall be electrically supervised for open circuit and ground fault. The fire alarm control panel shall be capable of t-tapping Class B (NFPA Style 4) Signaling Line Circuits (SLCs). Systems that do not allow or have restrictions in, for example, the amount of t-taps, length of t-taps etc., are not acceptable.

iii) Terminal Boxes, Junction Boxes and Cabinets: All boxes and cabinets shall be UL listed for their use and purpose.

iv) Initiating circuits shall be arranged to serve like categories (manual, smoke, waterflow). Mixed category circuitry shall not be permitted except on signaling line circuits connected to intelligent reporting devices.

v) The fire alarm control panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as FIRE ALARM. Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely to either a cold water pipe or grounding rod.

Main Fire Alarm Control Panel or Network Node

a. Main FACP or network node shall be a 1 Loop- 100+ 100 (Detectors+ Devices) Panel and shall contain a microprocessor based Central Processing Unit (CPU) and power supply in an economical space saving single board design. The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors, addressable modules, printer, annunciators, and other system controlled devices.

b. Operator Control

- Acknowledge Switch: Activation of the control panel acknowledge switch in response to new alarms and/or troubles shall silence the local panel piezo electric signal and change the alarm and trouble LEDs from flashing mode to steady-ON mode. If multiple alarm or trouble conditions exist, depression of this switch shall advance the LCD display to the next alarm or trouble condition. Depression of the Acknowledge switch shall also silence all remote annunciator piezo sounders.
- Alarm Silence Switch: Activation of the alarm silence switch shall cause all programmed alarm notification appliances and relays to return to the normal condition after an alarm condition. The selection of notification circuits and relays that are silenceable by this switch shall be fully field programmable within the confines of all applicable standards. The FACP software shall include silence inhibit and auto-silence timers.
- Alarm Activate (Drill) Switch: The Alarm Activate switch shall activate all notification appliance circuits. The drill function shall latch until the panel is silenced or reset.
- System Reset Switch: Activation of the System Reset switch shall cause all electronically-latched initiating devices, appliances or software zones, as well as all associated output

devices and circuits, to return to their normal condition. The Lamp Test switch shall activate all local system LEDs, light each segment of the liquid crystal display and display the panel software revision for service personal.

c. System Capacity and General Operation

- The control panel or each network node shall provide, or be capable of expansion to 636 intelligent/addressable devices.
- The control panel or each network node shall include Form-C alarm, trouble, supervisory, and security relays rated at a minimum of 2.0 amps @ 30 VDC. It shall also include four Class B (NFPA Style Y) or Class A (NFPA Style Z) programmable Notification Appliance Circuits.
- The control panel or each network node shall support up to 8 additional output modules (signal, speaker, telephone, or relay), each with 8 circuits for an additional 64 circuits. These circuits shall be either Class A (NFPA Style Z) or Class B (NFPA Style Y) per the project drawings.
- The system shall include a full featured operator interface control and annunciation panel that shall include a backlit Liquid Crystal Display (LCD), individual color coded system status LEDs, and an alphanumeric keypad with

  easy touch rubber keys for the field programming and control of the fire alarm system.
- The system shall be programmable, configurable, and expandable in the field without the need for special tools, PROM programmers or PC based programmers. It shall not require replacement of memory ICs to facilitate programming changes.
- The system shall allow the programming of any input to activate any output or group of outputs. Systems that have limited programming (such as general alarm), have complicated programming (such as a diode matrix), or require a laptop personal computer are not considered suitable substitutes.
- The FACP shall support up to 20 logic equations, including "and," "or," and "not," or time delay equations to be used for advanced programming. Logic equations shall require the use of a PC with a software utility designed for programming.
- The FACP or each network node shall provide the following features:
  - Drift compensation to extend detector accuracy over life. Drift compensation shall also include a smoothing feature, allowing transient noise signals to be filtered out.
  - Detector sensitivity test, meeting requirements of NFPA 72, Chapter 7.
  - Maintenance alert, with two levels (maintenance alert/maintenance urgent), to warn of excessive smoke detector dirt or dust accumulation.
  - Nine sensitivity levels for alarm, selected by detector. The alarm level range shall be .5 to 2.35 percent per foot for photoelectric detectors and 0.5 to 2.5 percent per foot for ionization detectors. The system shall also support sensitive advanced detection laser detectors with an alarm level range of .03 percent per foot to 1.0 percent per foot. The system shall also include up to nine levels of Prealarm, selected by detector, to indicate impending alarms to maintenance personnel.
  - The ability to display or print system reports.
  - Alarm verification, with counters and a trouble indication to alert maintenance personnel when a detector enters verification 20 times.
  - PAS presignal, meeting NFPA 72 3-8.3 requirements.

- Rapid manual station reporting (under 3 seconds) and shall meet NFPA 72 Chapter 1 requirements for activation of notification circuits within 10 seconds of initiating device activation.
- Periodic detector test, conducted automatically by the software.
- Self optimizing pre-alarm for advanced fire warning, which allows each detector to learn its particular environment and set its prealarm level to just above normal peaks.
- Cross zoning with the capability of counting: two detectors in alarm, two software zones in alarm, or one smoke detector and one thermal detector.
- alk test, with a check for two detectors set to same address.
- Control-by-time for non-fire operations, with holiday schedules.
- Day/night automatic adjustment of detector sensitivity.
- Device blink control for sleeping areas.

• The FACP shall be capable of coding main panel node notification circuits in March Time (120 PPM), Temporal (NFPA 72 A-2-2.2.2), and California Code. Panel notification circuits (NAC 1,2,3 and 4) shall also support Two-Stage operation, Canadian Dual Stage (3 minutes) and Canadian Dual Stage (5 minutes). Two stage operation shall allow 20 Pulses Per Minute (PPM) on alarm and 120 PPM after 5 minutes or when a second device activates. Canadian Dual stage is the same as Two-Stage except will only switch to second stage by activation of Drill Switch 3 or 5 minute timer. The panel shall also provide a coding option that will synchronize specific strobe lights designed to accept a specific "sync pulse."

d. Network Communication

The network architecture shall be based on a Local Area Network (LAN), a firmware package that utilizes a peer-to-peer, inherently regenerative communication format and protocol. The network shall use a deterministic token-passing method. Collision detection and recovery type protocols are not acceptable substitutes due to life safety requirements. In addition, there shall be no master, polling computer, central file computer, display controller or other central element (weak link) in the network which, on failure, may cause complete loss of network communications or cause major degradation of network capability. There shall be no cascading of CPUs or master-slave relationships at the network level to facilitate network communications. Failure of any node shall not cause failure or communication degradation of any other node or change the network communication protocol among surviving nodes located within distance limitations. Each node/panel shall communicate on the network at a baud rate of not less than 312 KBPS (kilo bits per second). A node may be an intelligent Fire Alarm Control Panel (FACP), Network Control Station PC (NCS) or Network Control Annunciator (NCA). The network shall be capable of expansion to at least 100 nodes. Each network node address shall be capable of storing Event equations. The event equations shall be used to activate outputs on one network node from inputs on other network nodes. The network shall be capable of communicating via wire or fiber optic medium. A wire network shall include a fail-safe means of isolating the nodes in the unlikely event of complete power loss to a node. A network repeater shall be available to increase the twisted-pair distance capability in 3,000 ft. increments.

e. Central Microprocessor

- The microprocessor shall be a state-of-the-art, high speed, 16-bit RISC device and it shall communicate with, monitor and control all external interfaces. It shall include an EPROM for system program storage, Flash memory for building-specific program

storage, and a "watch dog" timer circuit to detect and report microprocessor failure.

- The microprocessor shall contain and execute all control-by-event programs for specific action to be taken if an alarm condition is detected by the system. Control-by-event equations shall be held in non-volatile programmable memory, and shall not be lost even if system primary and secondary power failure occurs.
- The microprocessor shall also provide a real-time clock for time annotation of system displays, printer, and history file. The time-of-day and date shall not be lost if system primary and secondary power supplies fail. The real time clock may also be used to control non-fire functions at programmed time-of-day, dayof-week, and day-of-year.
- A special program check function shall be provided to detect common operator errors.
- An auto-program (self-learn) function shall be provided to quickly install initial functions and make the system operational.
- For flexibility and to ensure program validity, an optional Windows(TM) based program utility shall be available. This program shall be used to off-line program the system with batch upload/download, and have the ability to upgrade the manufacturers (FLASH) system code changes. This program shall also have a verification utility, which scans the program files, identifying possible errors. It shall also have the ability to compare old program files to new ones, identifying differences in the two files to allow complete testing of any system operating changes. This shall be in incompliance with the NFPA 72 requirements for testing after system modification.

f. System Display

- The system shall support the following display mode options: 80 character display option. The display shall include an 80-character backlit alphanumeric Liquid Crystal Display (LCD) and a full PC style QWERTY keypad.
- The display shall provide all the controls and indicators used by the system operator: The 80-character display shall include the following operator control switches: ACKNOWLEDGE, ALARM SILENCE, ALARM ACTIVATE (drill), SYSTEM RESET, and LAMP TEST.
- The display shall annunciate status information and custom alphanumeric labels for all intelligent detectors, addressable modules, internal panel circuits, and software zones.
- The display shall also provide Light-Emitting Diodes.
- The 80-character display shall provide 8 Light-Emitting-Diodes (LEDs), that indicate the status of the following system parameters: AC POWER, FIRE

ALARM, PREALARM WARNING, SECURITY ALARM, SUPERVISORY SIGNAL, SYSTEM TROUBLE, DISABLED POINTS, and ALARM SILENCED.

- The 80-character display keypad shall be an easy to use QWERTY type keypad, similar to a PC keyboard. This shall be part of the standard system and have the capability to command all system functions, entry of any alphabetic or numeric information and field programming. Two different password levels shall be provided to prevent unauthorized system control or programming.
- The system shall support the display of battery charging current and voltage on the 80-character LCD display.

g. Signaling Line Circuits (SLC)

Each FACP or FACP network node shall support up to two SLCs. Each SLC interface shall provide power to and communicate with up to 125 intelligent detectors (ionization, photoelectric or thermal) and 125 intelligent modules (monitor or control) for a loop capacity of 400 detectors. The addition of the optional second loop shall double the device capacity, Panel should have expansion capacity. Each SLC shall be capable of NFPA 72 Style 4, Style 6, or Style 7 (Class A or B) wiring. CPU shall receive analog information from all intelligent detectors to be processed to determine whether normal, alarm, prealarm, or trouble conditions exist for each detector. The software shall automatically maintain the detector's desired sensitivity level by adjusting for the effects of environmental factors, including the accumulation of dust in each detector. The analog information shall also be used for automatic detector testing and for the automatic determination of detector maintenance requirements.

h. Serial Interfaces

The system shall include two serial EIA-232 interfaces. Each interface shall be a means of connecting UL Listed Information Technology Equipment (ITE) peripherals.

i. Notification Appliance Circuit (NAC) Module

The Notification Appliance Circuit module shall provide four fully supervised Class A or B (NFPA Style Z or Y) notification circuits. An expansion circuit board shall allow expansion to eight circuits per module. The notification circuit capacity shall be 3.0 amperes maximum per circuit and 6.0 amperes maximum per module. The module shall not affect other module circuits in any way during a short circuit condition. The module shall provide eight green ON/OFF LEDs and eight yellow trouble LEDs. The module shall also provide a momentary switch per circuit that may be used to manually turn the particular circuit on or off or to disable the circuit.

Each notification circuit shall include a custom label inserted to identify each circuit's location. Labels shall be created using a standard typewriter or word processor. The notification circuit module shall be provided with removable wiring terminal blocks for ease of installation and service. The terminal strips shall be UL listed for use with up to 12 AWG wire. Each circuit shall be capable of, through system programming, deactivating upon depression of the signal silence switch.

j. Control Relay Module

The control relay module shall provide four Form-C auxiliary relay circuits rated at 5 amperes, 28 VDC. An expansion circuit board shall allow expansion to eight Form-C relays per module. Each relay circuit shall be capable of being activated (change in state) by any initiating device or from any combination of initiating devices. The relay module shall provide 8 green ON/OFF LEDs and 8 yellow LEDs (indicates disabled status of the relay). The module shall provide a momentary switch per relay circuit that may be used to manually turn the relay ON/OFF or to disable the relay. Each relay circuit shall include a custom label inserted to identify its location. Labels shall be created using a standard typewriter or word processor. The control relay module shall be provided with removable wiring terminal blocks for ease of installation and service. The terminal blocks shall be UL listed for use with up to 12 AWG wire.

k. Enclosures:

The control panel shall be housed in a UL-listed cabinet suitable for surface or semi- flush mounting. The cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish. The back box and door shall be constructed of 0.060 steel with provisions for electrical conduit connections into the sides and top. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators. For convenience, the door may be site configured for either right or left hand hinging.

l. Power Supply:

A high tech off-line switching power supply shall be available for the fire alarm control panel or network node and provide 6.0 amps of available power for the control panel and peripheral devices. Provisions will be made to allow the audio-visual power to be increased as required by adding modular expansion audio-visual power supplies. Positive-Temperature-Coefficient (PTC) thermistors, circuit breakers, or other over-current protection shall be provided on all power outputs. The power supply shall provide an integral battery charger for use with batteries up to 60 AH or may be used with an external battery and charger system. Battery arrangement may be configured in the field. The power supply shall continuously monitor all field wires for earth ground conditions, and shall have the following LED indicators: Ground Fault LED AC Power Fail LED NAC on LED (4) The main power supply shall operate on 120 VAC, 60 Hz, and shall provide all necessary power for the FACP. The main power supply shall

provide a battery charger using dual-rate charging techniques for fast battery recharge and be capable of charging batteries up to 60 All. All circuits shall be power-limited, per UL864 requirements.

m. Field Charging Power Supply (FCPS):

The FCPS is a device designed for use as either a remote 24 volt power supply or used to power Notification Appliances. The FCPS shall offer up to 6.0 amps (4.0 amps continuous) of regulated 24 volt power. It shall include an integral charger designed to charge 7.0 amp hour batteries and to support 60 hour standby. The Field Charging Power Supply shall have two input triggers. The input trigger shall be a Notification Appliance Circuit (from the fire alarm control panel) or a relay. Four outputs (two Style Y or Z and two style Y) shall be available for connection to the Notification devices. The FCPS shall include an attractive surface mount backbox. The Field Charging Power Supply shall include the ability to delay the AC fail delay per NFPA requirements. The FCPS include power limited circuitry, per 1995 UL standards.

n. Specific System Operations

- Smoke Detector Sensitivity Adjust: A means shall be provided for adjusting the sensitivity of any or all addressable intelligent detectors in the system from the system keypad. Sensitivity range shall be within the allowed UL window and have a minimum of 9 levels.
- Alarm Verification: Each of the intelligent addressable smoke detectors in the system may be independently selected and enabled to be an alarm verified detector. The alarm verification delay shall be programmable from 5 to 30 seconds and each detector shall be able to be selected for verification. The FACP shall keep a count of the number of times that each detector has entered the verification cycle. These counters may be displayed and reset by the proper operator commands.
- Point Disable: Any addressable device or conventional circuit in the system may be enabled or disabled through the system keypad.
- Point Read: The system shall be able to display or print the following point status diagnostic functions:

– Device status

– Device type

– Custom device label

– View analog detector values

– Device zone assignments

– All program parameters

- System Status Reports: Upon command from an operator of the system, a status report will be generated and printed, listing all system status.
- System History Recording and Reporting: The fire alarm control panel shall contain a history buffer that will be capable of storing up to 800 events. Up to 200 events shall be dedicated to alarm and the remaining events are general purpose. Systems that do not have dedicated alarm storage, where events are overridden by non-alarm type events, are not suitable substitutes. Each of these activations will be stored and time and date stamped with the actual time of the activation. The contents of the history buffer may be manually reviewed, one event at a time, or printed in its entirety. The history buffer shall use non-volatile memory. Systems that use volatile memory for history storage are not acceptable substitutes.
- Automatic Detector Maintenance Alert: The fire alarm in the system responds with a reading that is above or below normal limits, then the system will enter the trouble mode, and the particular detector will be annunciated on the system display, and printed on the optional printer. This feature control panel shall automatically interrogate each intelligent detector and shall analyze the detector responses over a period of time. If any intelligent detector shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.
- Pre-Alarm Function: The system shall provide two levels of pre-alarm warning to give advance notice of a possible fire situation. Both pre-alarm levels shall be fully field adjustable. The first level shall give an audible indication at the panel. The second level shall give an audible indication and may also activate control relays. The system shall also have the ability to activate local detector sounder bases at the pre-alarm level, to assist in avoiding nuisance alarms.
- Software Zones: The FACP shall provide 100 software zones, 10 additional special function zones, 10 releasing zones, and 20 logic zones.
- The fire alarm control panel shall include a walk test feature. It shall include the ability to test initiating device circuits and notification appliance circuits from the field without returning to the panel to reset the system. Operation shall be as follows:

Alarming an initiating device shall activate programmed outputs, which are selected to participate in walk test, for 3 seconds. Introducing a trouble into the initiating device shall activate the programmed outputs for 8 seconds. All devices tested in walk test shall be recorded in the history buffer.

- Waterflow Operation: An alarm from a waterflow detection device shall activate the appropriate alarm message on the main panel display, turn on all programmed notification appliance circuits and shall not be affected by the signal silence switch.
  - Supervisory Operation: An alarm from a supervisory device shall cause the appropriate indication on the system display, light a common supervisory LED, but will not cause the system to enter the trouble mode.
  - Signal Silence Operation: The FACP shall have the ability to program each output circuit (notification, relay, speaker etc) to deactivate upon depression of the signal silence switch.
  - Non-Alarm Input Operation: Any addressable initiating device in the system may be used as a non-alarm input to monitor normally open contact type devices. Non-alarm functions are a lower priority than fire alarm initiating devices.
  - Combo Zone: A special type code shall be available to allow waterflow and supervisory devices to share a common addressable module. Waterflow devices shall be

wired in parallel, supervisory devices in series.

System Components

a. Speakers

All speakers shall operate on 25 VRMS or with field selectable output taps from 0.5 to 2.0 Watts. Speakers in corridors and public spaces shall produce a nominal sound output of 85 DB at 10 feet (3m). Frequency response shall be a minimum of 400 HZ to 4000 HZ. The back of each speaker shall be sealed to protect the speaker cone from damage and dust.

b. Projected Beam Detectors

The projected beam type shall be a 4-wire 24 VDC device. The detector shall be listed to UL 268 and shall consist of a separate transmitter and receiver capable of being powered separately or together. The detector shall operate in either a short range (30' - 100') or long range (100' - 330') mode. The temperature range of the device shall be - 22 degrees F to 131 degrees F.

The detector shall feature a bank of four alignment LEDs on both the receiver and the transmitter that are used to ensure proper alignment of unit without special tools. Beam detectors shall feature automatic gain control which will compensate for gradual signal deterioration from dirt accumulation on lenses. The unit shall be both ceiling and wall mountable. The detector shall have the ability to be tested using calibrated test filters or magnet activated remote test station.

c. Alphanumeric LCD Type Annunciator

The alphanumeric display annunciator shall be a supervised, remotely located back-lit LCD display containing a minimum of eighty (80) characters for alarm annunciation in clear English text. The LCD annunciator shall display all alarm and trouble conditions in the system. An audible indication of alarm shall be integral to the alphanumeric display. The display shall be UL listed for fire alarm application. It shall be possible to connect up to 32 LCD displays and be capable of wiring distances up to 6,000 feet from the control panel. The annunciator shall connect to a separate, dedicated "terminal mode" EIA-485 interface. This is a two-wire loop connection and shall be capable of distances to 6,000 feet. Each terminal mode LCD display shall mimic the main control panel.

The system shall allow a minimum of 32 terminal mode LCD annunciators. Up to 10 LCD annunciators shall be capable of the following system functions: Acknowledge, Signal Silence and Reset, which shall be protected from unauthorized use by a key switch or password.

d. All interfaces and associated equipment are to be protected so that they will not be affected by voltage surges or line transients consistent with UL standard 864.

e. Field Wiring Terminal Blocks

For ease of service all panel I/O wiring terminal blocks shall be removable, plug-in types and have sufficient capacity for #18 to #12 AWG wire. Terminal blocks that are permanently fixed are not acceptable.

System Components – Addressable Devices a.

Addressable Devices - General

- Addressable devices shall use simple to install and maintain decade, decimal address switches. Devices shall be capable of being set to an address in a range of 001 to 159.
- Addressable devices, which use a binary-coded address setting method, such as a DIP-switch, are not an allowable substitute.

- Detectors shall be intelligent (analog) and addressable, and shall connect with two wires to the fire alarm control panel Signaling Line Circuits.
- Addressable smoke and thermal detectors shall provide dual alarm and power / polling LEDs. Both LEDs shall flash green under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady red illumination by the control panel, indicating that an alarm condition has been detected. If required, the LED flash shall have the ability to be removed from the system program. An output connection shall also be provided in the base to connect an external remote alarm LED.
- The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system. The panel on a time-of-day basis shall automatically adjust sensitivity.
- Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72, Chapter 7.
- The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature. Bases shall include a sounder base with a built-in (local) sounder rated at 85 DBA minimum, a relay base and an isolator base designed for Style 7 applications.
- The detectors shall provide a test means whereby they will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a magnetic switch) or initiated remotely on command from the control panel.
- Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (ION, PHOTO, THERMAL).
- Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector.
- Addressable devices shall store an internal identifying code that the control panel shall use to identify the type of device.
- Addressable modules shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box. An optional surface mount Lexan enclosure shall be available.

b. Addressable Manual Fire Alarm Box (manual station)

Addressable manual fire alarm boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.

Manual fire alarm boxes shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches (44 mm) or larger.

c. Intelligent Photoelectric Smoke Detector

The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.

d. Intelligent Laser Photo Smoke Detector

The intelligent laser photo smoke detector shall be a spot type detector that incorporates an extremely bright laser diode and an integral lens that focuses the light beam to a very small volume near a receiving photo sensor. The scattering of smoke particles shall activate the photo sensor. The laser detector shall have conductive plastic so that dust accumulation is reduced significantly. The intelligent laser photo detector shall have nine sensitivity levels and be sensitive to a minimum obscuration of 0.03 percent per foot. The laser detector shall not require expensive conduit, special fittings or PVC pipe. The intelligent laser photo detector shall support standard, relay, isolator and sounder detector bases. The laser photo detector shall not require other cleaning requirements than those listed in NFPA 72. Replacement, refurbishment or specialized cleaning of the detector head shall not be required. The laser photo detector shall include two bicolor LEDs that flash green in normal operation and turn on steady red in alarm.

e. Intelligent Ionization Smoke Detector

The detectors shall use the dual-chamber ionization principal to measure products of combustion and shall, on command from the control panel, send data to the panel representing the analog level of products of combustion.

f. Intelligent Multi Criteria Acclimating Detector

The intelligent multi criteria Acclimate detector shall be an addressable device that is designed to monitor a minimum of photoelectric and thermal technologies in a single sensing device. The design shall include the ability to adapt to its environment by utilizing a built-in microprocessor to determine it's environment and choose the appropriate sensing settings. The detector design shall allow a wide sensitivity window, no less than 1 to 4% per foot obscuration. This detector shall utilize advanced electronics that react to slow smoldering fires and thermal properties all within a single sensing device. The microprocessor design shall be capable of selecting the appropriate sensitivity levels based on the environment type it is in (office, manufacturing, kitchen etc.) and then have the ability to automatically change the setting as the environment changes (as walls are moved or as the occupancy changes).

The intelligent multi criteria detection device shall include the ability to combine the signal of the thermal sensor with the signal of the photoelectric signal in an effort to react hastily in the event of a fire situation. It shall also include the inherent ability to distinguish between a fire condition and a false alarm condition by examining the

characteristics of the thermal and smoke sensing chambers and comparing them to a database of actual fire and deceptive phenomena.

g. Intelligent Thermal Detectors

Thermal detectors shall be intelligent addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. It shall connect via two wires to the fire alarm control panel signaling line circuit.

h. Intelligent Duct Smoke Detector

The smoke detector housing shall accommodate either an intelligent ionization detector or an intelligent photoelectric detector, of that provides continuous analog monitoring and alarm verification from the panel. When sufficient smoke is sensed, an alarm signal is initiated at the

FACP, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system.

i. Addressable Dry Contact Monitor Module

Addressable monitor modules shall be provided to connect one supervised DC zone of conventional alarm initiating devices (any N.O. dry contact device) to one of the fire alarm control panel SLCs. The DC zone shall be suitable for Style D or Style B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel. For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4 inch (70 mm) x 1-1/4 inch (31.7 mm) x 1/2 inch (12.7 mm). This version need not include Style D or an LED.

j. Two Wire Detector Monitor Module

Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device). The DC zone may be wired for Class A or B (Style D or Style B) operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

k. Addressable Control Module

Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual notification appliances. The control module NAC may be wired for Style Z or Style Y (Class A/B) with up to 1 amp of inductive A/V signal, or 2 amps of resistive A/V signal operation.

Audio/visual power shall be provided by a separate supervised power circuit from the main fire alarm control panel or from a supervised UL listed remote power supply. The control module shall be suitable for pilot duty applications and rated for a minimum of 0.6 amps at 30 VDC.

l. Addressable Relay Module

Addressable Relay Modules shall be available for HVAC control and other building functions. The relay shall be form C and rated for a minimum of 2.0 Amps resistive or 1.0 Amps inductive. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary relay or NACs may be energized at the same time on the same pair of wires.

m. Isolator Module

Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC Class A or Class B branch. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop segment or branch. At least one isolator module shall be provided for each floor or protected zone of the building. If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the SLC. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section. The isolator module shall not require address-setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation. The isolator module shall provide a single LED that shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.

Batteries

The battery shall have sufficient capacity to power the fire alarm system for not less than twenty-four hours plus 5 minutes of alarm upon a normal AC power failure. The batteries are to be

completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required. If necessary to meet standby requirements, external battery and charger systems may be used.

Execution

a. Installation

Installation shall be in accordance with the NEC, NFPA 72, local and state codes and as recommended by the major equipment manufacturers. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system

programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas. Manual fire alarm boxes shall be suitable for surface mounting or semi-flush mounting as shown on the plans, and shall be installed not less than 42 inches (1067 mm), nor more than 48 inches (122 mm) above the finished floor.

b. Test

The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All tests to be done by contractor at his own cost.

i. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

ii. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.

iii. Verify activation of all waterflow switches.

iv. Open initiating device circuits and verify that the trouble signal actuates.

v. Open and short signaling line circuits and verify that the trouble signal actuates.

vi. Open and short notification appliance circuits and verify that trouble signal actuates.

vii. Ground all circuits and verify response of trouble signals.

viii. Check presence and audibility of tone at all alarm notification devices.

ix. Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.

x. Each of the alarm conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

xi. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

Fire Detection Panel shall have the following inbuilt features

a. Compatibility with Building Management System (BMS), through the provision of a network card, which can provide MODBUS RTU/ Other acceptable Communications protocol to the BMS System.

b. Web Server, for remote monitoring. Dedicated Telephone line for Dial-up shall be provided by the RITES.

c. Built in Release circuits. UL Listed

IX. High Sensitivity Smoke Detection System

General

- A Very Early Smoke Detection System similar to the VEWSD System shall be installed throughout the areas nominated on the drawings.

- The system shall consist of highly sensitive LASER-based Smoke Detectors with aspirators connected to networks of sampling pipes.
- The detector will be able to identify which pipe is carrying smoke.
- When required, an optional Display unit shall be provided to monitor each detector, and a Programmer shall be supplied to configure the system.

Regulatory Requirements

The Very Early Smoke Detection System must be of a type submitted to, tested, approved, and listed by:

- LPCB (Loss Prevention Certification Board), UK
- Vds (Verband der Sachversicherer e.V), Germany
- FM (Factory Mutual), US
- UL (Underwriters Laboratories Inc), US
- ULC (Underwriters Laboratories Canada), Canada

The entire installation shall be installed to comply with one or more of the following codes or standards:

- NFPA Standards, US
- NEC Standards, US
- Local codes and standards
- Year 2000 compliancy standards including, LPS2000, GTE PA96014T

System Description

Shall consist of a highly sensitive LASER-based smoke detector, aspirator, and filter. The detection unit shall also include a scanning valve mechanism to identify which sampling pipe is carrying smoke.

It shall be modular, with each detector optionally monitored by a Display featuring LEDs and a sounder. The system shall be configured by a Programmer that is either integral to the system, portable or PC based.

The system shall allow programming of:

- four smoke threshold alarm levels per pipe (sector);
- time delays;
- faults including airflow, detector, power, filter and network as well as an indication of the urgency of the fault;
- Seven or twelve configurable relay outputs for remote indication of alarm and fault conditions.
- It shall consist of an air sampling pipe network to transport air to the detection system, supported by calculations from a computer-based design modeling tool.

Optional equipment may include intelligent remote displays and/or a high level interface with the building fire alarm system, or a dedicated System Management (VSM) graphics package.

Performance Requirements

- Shall be tested and approved to cover up to 20,000 sq. ft.
- Shall be approved to provide very early smoke detection and provide four output levels

corresponding to Alert, Action, Fire 1 and Fire 2 per pipe (sector). These levels shall be programmable and able to be set at sensitivities ranging from 0.0015–6% obsc/ft. For compliance to UL approval range is 0.00 15-4% obsc/ft.

- Shall report any fault on the unit by using configurable fault output relays or via VSM.
- Shall be self monitoring for filter contamination.
- Shall incorporate a flow sensor in each pipe and provide staged airflow faults.

Submittals

- Product data and site drawings shall be submitted and shall include pipe layout, operational calculations by a software and performance criteria.
- A copy of the manufacturer's installation, operation and maintenance manuals shall be supplied upon completion of the installation.
- System commissioning data shall be supplied (in a format recommended by the manufacturer and per the instructions provided by the manufacturer) within 30 days of completion of the installation.

Quality Assurance Qualifications

i. Manufacturer- The manufacturer shall have a minimum of 15 years production experience in the manufacturer and design of high sensitivity Air Sampling-type smoke detection systems. The manufacturer shall be certified as meeting ISO 9002 for manufacturing.

ii. Technology - Both Light Scattering and Particle Counting shall be utilized in this device as follows:

The Laser Detection Chamber shall be of the mass Light Scattering type and capable of detecting a wide range of smoke particle types of varying size. A particle counting method shall be employed for the purposes of

- preventing large particles from affecting the true smoke reading
- Monitoring contamination of the filter (dust & dirt etc.) to automatically notify when maintenance is required.

Note: The Particle counting circuitry shall not be used for the purpose of smoke density measurement.

The Laser Detection Chamber shall incorporate a separate secondary clean air feed from the filter; providing clean air barriers across critical detector optics to eliminate internal detector contamination. The detector shall not use adaptive algorithms to adjust the sensitivity from that set during commissioning. A learning tool shall be provided to ensure the best selection of appropriate alarm thresholds during the commissioning process.

iii. Equipment Supplier - The equipment supplier shall be authorized and trained by the manufacturer to calculate/design, install, test and maintain the air sampling system and shall be able to produce a certificate stating such on request.

Detector Assembly

1. The Detector, Filter, Aspirator and Relay Outputs shall be housed in a mounting box and shall be arranged in such a way that air is drawn from the fire risk and a sample passed through the Dual Stage Filter and Detector by the Aspirator.
2. The detection unit shall also include a scanning valve mechanism to identify which sampling pipe is carrying smoke

The valve mechanism shall:

- be integrated into the detector
- begin to sample each pipe individually upon detection of smoke
- be used to identify the level of smoke in each pipe
- be used to indicate in which pipe an alarm was first detected
- operate upon manual activation of the scan button on the detector display
- be automatically tested daily to ensure uninterrupted protection

iv. The system shall utilise the principle of sampling all sectors simultaneously. When a scan smoke level is reached, an automatic sequence shall be initiated to sample each sector individually. If an alarm threshold level is reached a First Alarm Sector is indicated and signalled. The unit shall then continue its sequence monitoring until the smoke level signal reduces below the scan level.

v. The Detector shall be LASER-based type and shall have an obscuration sensitivity range of 0.0015%/ft – 6% obsc/ft.

vi. The Detector shall have four independent field programmable smoke alarm thresholds per pipe (sector) and a programmable scan time delay.

vii. The Detector shall also incorporate facilities to transmit the following faults

- Detector
- Air flow
- Filter
- System
- Zone
- Network
- Power
- Urgent and Minor faults. Minor faults shall be considered as servicing or maintenance signals. Urgent faults indicate the unit may not be able to detect smoke.

viii. The detector shall have four in-line sample pipe inlets and must contain a flow sensor for each pipe inlet. Both Minor and Urgent flow faults can be reported.

ix. The filter must be a two-stage disposable filter cartridge. The first stage shall be capable of filtering particles in excess of 20 microns from the air sample. The second stage shall be ultra- fine, removing more than 99% of contaminant particles of 0.3microns or larger, to provide a clean air barrier around the detector's optics to prevent contamination and increase service life.

x. The aspirator shall be a purpose-designed rotary vane air pump. It shall be capable of allowing for multiple sampling pipe runs up to 600 ft. in total, (4 pipe runs per detector) with a transport time of less than 120 seconds or as appropriate codes dictate.

xi. The Assembly must contain relays for alarm and fault conditions. The relays shall be software programmable to the required functions. The relays must be rated at 2 AMP at 30

i. When required, a detector Display module may be located within the detector, a remote mounting box or a 19 inch remote rack.

VDC. Remote relays shall be offered as an option and either configured to replicate those on the detector or programmed differently.

xii. The Assembly shall be able to be surface mounted to a wall or recessed in the wall cavity (the unit may be inverted in either option).

xiii. The assembly shall have built-in event and smoke logging. It shall store smoke levels, alarm conditions, operator actions and faults. The date and time of each even shall be recorded. Each detector (zone) shall be capable of storing up to 18,000 events and does not require the presence of a display in order to do so.

Displays

ii. Each Display shall provide the following features at a minimum:

- A 20 segment bar graph display.
- Four independent high intensity alarm indicators, Alert, Action, Fire 1 and Fire2, are corresponding to the four alarm thresholds of the indicated sector.
- Alarm threshold indicators for Alert, Action and Fire 1.
- LED indication that the First Alarm Sector is established
- LED indication of which pipe(s) is carrying smoke
- Detector fault and airflow fault indicators.
- Faults originating in the particular zone (Zone Fault) shall be distinguished from those produced by the overall smoke detection system and from those resulting from network wiring errors (Network Fault). LED indicators shall be provided for each fault category.
- Minor and urgent fault LED indicators.
- A remotely mounted Display may be optionally equipped with 7 or 12 configurable relays for signalling alarm and fault conditions.
- Four buttons supporting the following features:

a) Mode/Test - Scrolls through the information on the Display's digital display: Sensitivity (Fire 1 Threshold setting), current smoke level, Zone number and First Alarm Sector. When pressed and held initiates a lamp test on the individual display module.

b) Silence/Scan - Silences all devices on the system. When pressed and held initiates a manual scan test.

c) Reset - Unlatches all latched alarm conditions on the assigned VLS zone.

d) Isolate – Isolates the individual VLS zone (inhibits Alarm and Fault relays and initiates the Isolate relay).

Programmers

a. When required, a Programmer module may be located within the detector, a remote mounting box, a 19 inch remote rack, or in a portable hand-held unit. Alternatively, programming may be performed using a Windows® application running on a PC connected through a High Level Interfacing unit (PC-Link HLI).

b. Each Programmer shall support the following features at a minimum:

- Programming of any device on the system.

- Viewing of the status of any device in the system.
- Adjustment of relative alarm thresholds for each pipe (sector factor)
- Adjustment of period of sampling for each pipe
- Software configuration for either 7 or 12 relays
- Setting of Day/night, weekend and holiday sensitivity threshold settings.
- Initiation of AutoLearn^{TM}, to automatically configure the detector's alarm threshold settings to suit the current environment.
- Multi-level password control.
- Programmable latching or non-latching relay operation.
- Programmable energized or de-energised relays.
- Programmable high and low flow settings for airflow supervision.
- Programmable aspirator speed control.
- Programmable maintenance intervals.
- Facilities for referencing with time dilution compensation.
- Testing of relays assigned to a specific zone to aid commissioning. **Device**

Networking Requirements

a. The devices in the smoke detection system shall be capable of communicating with each other via twisted pair RS485 cable. The network shall be able to support up to 250 devices (detectors, displays and programmers), of which at least 100 detectors can be supported.

b. The network shall be capable of being configured in a fault tolerant loop for both short circuit and open circuit. Any communication faults shall be reported unambiguously and shall be clearly attributable to an individual device or wire link in the fault messages.

c. PC based configuration tools shall be available to configure and manage the network of detectors.

Digital Communication Port

Shall comply with EIA RS485 Protocol.

Application

a. Detection Alarm Levels

The laser based Air Sampling detection system shall have four (4) alarm thresholds per pipe (sector). The four alarm levels may be used as follows:

- Alarm Level 1 (Alert)

  Activate a visual and audible alarm in the fire risk area.

- Alarm Level 2 (Action)

Activate the electrical/electronic equipment shutdown relay and activate

visual and audible alarms in the Security Office or other appropriate location.

- Alarm Level 3 (Fire 1) Activate an alarm condition in the Fire Alarm Control Panel to call the Fire Brigade and activate all warning systems.
- Alarm Level 4 (Fire 2) Activate evacuation action or shut down of systems).

b. Initial Detection Alarm Settings

Initial settings for the alarm levels shall be determined by the requirements of the fire zone. However, the setting for Fire 1 (Alarm Level 3) shall always appear as 100% on the bar graph scale. Default settings of the unit shall be:

- Alarm Level 1 (Alert) 0.025% Obs/ft
- Alarm Level 2 (Action) 0.044% Obs/ft
- Alarm Level 3 (Fire 1) 0.062% Obs/ft
- Alarm Level 4 (Fire 2) 0.61% Obs/ft

Each pipe shall have its alarm thresholds set by a Sector Factor. The Sector Factor range shall be between 0.5 and 2.0 (where 2.0 double the normal alarm threshold settings).

c. Initial (factory default) Delays

Initial (factory default) settings:

Scan Delay	10 seconds
Fault Alarm	5 seconds

d. Fault Alarms

The Detector Fault relay shall be connected to the appropriate alarm zone on the Fire Alarm Control Panel in such a way that a Detector Fault would register a fault condition on the FACP. The Minor Fault and Isolate relays shall also be connected to the appropriate control system.

(Check local Codes, Standards or Regulations to determine whether compliance with this set-up is required).

e. Power Supply and Batteries

The system shall be powered from a regulated supply of nominally 24V DC. The battery charger and battery shall comply with the relevant Codes, Standards or Regulations. Typically 24 hours standby battery back up is required followed by 30 minutes in an alarm condition.

Local Power Supply Standards that may apply: UL 1481 Listed (provided the power supply and standby batteries have been appropriately sized / rated to accommodate the system's power requirements). US Telecommunication Central Office Power Supply: The system shall operate on negative 48 VDC (provided continuously from the telephone central office power source) converted to 24VDC.

Sampling Pipe Design

Sampling Pipe

i. The sampling pipe shall be smooth bore with an internal diameter between 3/4 to 1 inch. Normally, pipe with an outside diameter of 25 mm and internal diameter of 21 mm should be used.

ii. The pipe material should be suitable for the environment in which it is installed, or should be the material as required by the specifying body.

iii. All joints in the sampling pipe must be air tight and made by using solvent cement, except at entry to the detector.

iv. The pipe shall be identified as Air Sampling Smoke Detector Pipe (or similar wording) along its entire length at regular intervals not exceeding the manufacturers' recommendation or that of local codes and standards.

v. All pipes should be supported at not less than 5ft centres, or that of the local codes or standards.

vi. The far end of each trunk or branch pipe shall be fitted with an end cap and drilled with a hole appropriately sized to achieve the performance as specified and as calculated by the system design.

Sampling Holes

Sampling holes of 5/64", or otherwise appropriately sized holes (see Section 3.05), shall not be separated by more than the maximum distance allowable for conventional point detectors as specified in the local code or standard. Intervals may vary according to calculations.

N.F.P.A. 72 (1996 Edition) the maximum allowable distance between sample points is 30 feet.

Each sampling point shall be identified in accordance with Codes or Standards.

Consideration shall be given to the manufacturers' recommendations and standards in relation to the number of Sampling Points and the distance of the Sampling Points from the ceiling or roof structure and forced ventilation systems.

Commissioning Tests

i. The contractor shall allow for the manufacturer's representative to attend commissioning of the entire installation in the presence of the owner and/or its representative.

ii. All necessary instrumentation, equipment, materials and labour shall be provided by the Contractor.

iii. The Contractor shall record all tests and system calibrations and a copy of these results shall be retained on site in the System Log Book.

System Checks

i. Visually check all pipes to ensure that all joints, fittings, bends, sampling points, etc., comply with the Specification.

ii. Check the system to ensure the following features are operational and programmed in accordance with the specification.

- Alarm threshold levels (for both day and night settings),
- Pipes in use,
- Detector address,
- Display address,
- Clock and date,

- Time delays,
- Air flow fault thresholds,
- Display buttons operable (Mode, Silence, Reset, Isolate),
- Referencing
- Units set to U.S./S.I.,

iii. Check to ensure that all ancillary warning devices operate as specified.

iv. Check interconnection with Fire Alarm Control Panel to ensure correct operation.

Tests

i. Introduce Smoke into the Detector Assembly to provide a basic functional test.

ii. Introduce smoke to the least favourable Sampling Point in each Sampling Pipe. Transport time is not to exceed the local codes (see 3.03).

iii. If more than two bar graph divisions illuminate under normal conditions (no smoke test), review event log for two (2) weeks from date of commissioning and make appropriate adjustments to the alarm and delay thresholds.

iv. Activate the appropriate Fire Alarm zones and advise all concerned that the system is fully operational. Fill out the log book and commissioning report accordingly.

IX. Fire Suppression System

Fire Suppression System - FM 200 Fire Suppression System

a. Purpose

This specification is for procurement of FM-200 Clean Agent Based Fire Suppression System. It shall be used as a standard for the system Equipment, System Installation and Acceptance testing.

b. Mandatory Bidding Requirements

The OEM (/ Bidder) shall give a Certificate stating that their FM-200 system is approved by UL / FM / VdS / LPC/CNPP for use with Seamless Steel Cylinders (Component as well as System Approval). The OEM (/ Bidder) shall also provide a Letter that the OEM has FM-200 Flow Calculation software suitable for Seamless Steel cylinder bided for as per the Bill of materials and that such Software shall be type approved by FM / UL / VdS / LPC.

c. Specific Technical Requirements

i. The Storage Container offered shall be of Seamless type, meant for exclusive use in FM-200 systems, with VdS/FM/UL/LPC/CNPP component approval. Welded cylinders are not permitted.

ii. The Seamless storage cylinder shall be approved by Chief Controller of Explosives, Nagpur and shall have NOC from CCE, Nagpur for import of the same. Documentary evidence to be provided for earlier imports done by the bidder.

iii. The FM-200 valve should be Differential Pressure Design and shall not require an Explosive / Detonation type Consumable Device to operate it.

iv. The FM-200 Valve operating actuators shall be of Electric (Solenoid) type, and it should be capable of resetting manually. The Valve should be capable of being functionally tested

for periodic servicing requirements and without any need to replace consumable parts.

v. The individual FM-200 Bank shall also be fitted with a manual mechanism operating facility that should provide actuation in case of electric failure.

vi. The system flow calculation be carried out on certified software, suitable for the Seamless Steel Cylinder being offered for this project. Such system flow calculations shall be also approved by VDS / LPC/ UL / FM.

vii. The system shall utilize 25 Bar (380 psi) technology that allows for a higher capacity to overcome frictional losses and allow for higher distances of the agent flow; and also allow for better agent penetration in enclosed electronic equipments such as Server Racks! Electrical Panels etc.

d. General Technical Requirements

i. The designer shall consider and address possible Fire hazards within the protected volume at the design stage. The delivery of the FM-200 system shall provide for the highest degree of protection and minimum extinguishing time. The design shall be strictly as per NFPA standard NFPA 2001.

ii. The suppression system shall provide for high-speed release of FM-200 based on the concept of total Flooding protection for enclosed areas. A Uniform extinguishing concentration shall be 7% (v!v) of FM-200 for 21 degree Celsius or higher as recommended by the manufacturer.

iii. The system discharge time shall be 10 seconds or less, in accordance with NFPA standard 2001.

iv. Sub floor and the ceiling void to be included in the protected volume.

v. The FM-200 systems to be supplied by the bidder must satisfy the various and all requirements of the Authority having Jurisdiction over the location of the protected area and must be in accordance with the OEM's product design criteria.

vi. The detection and control system that shall be used to trigger the FM-200 suppression shall employ cross zoning of photoelectric and ionization smoke detectors. A single detector in one zone activated, shall cause in alarm signal to be generated. Another detector in the second zone activated, shall generate a predischarge signal and start the pre-discharge condition.

vii. The discharge nozzles shall be located in the protected volume in compliance to the limitation with regard to the spacing, floor and ceiling covering etc. The nozzle locations shall be such that the uniform design concentration will be established in all parts of the protected volumes. The final number of the discharge nozzles shall be according to the OEM's certified software, which shall also be approved by third party inspection and certified such as UL ! FM ! VdS ! LPC.

viii. FM-200 shall be stored in seamless storage containers complying with the SMPV Rules set out by Chief Controller of Explosives, Nagpur, India. The Bidder shall be required to produce a NOC for the Chief Controller of Explosives, Nagpur for

the storage containers against the cylinder identification numbers punched on them.

ix. Welded cylinders for agent storage will not be acceptable – NOR shall be such Seamless cylinders & Cylinder manufacturers, that do not already have the approval of Chief Controller of Explosives, Nagpur.

x. The Cylinder shall be equipped with differential pressure valves and no replacement parts shall be necessary to recharge the FM-200 containers.

xi. FM-200 shall be discharged through the operation of an Electric (solenoid) operated device or pneumatically operated device, which releases the agent through a differential pressure

valve.

xii. Systems that employ explosive or pyrotechnic devices for FM-200 discharge shall not be permitted.

xiii. All system components shall be New and of Current manufacture and shall be installed in accordance with local codes.

xiv. The suppression agent shall be UL component recognized

xv. The bidder shall provide all documentation such as Cylinder Manufacturing Certificates. Test and Inspection Certificates and Fill Density Certificates.

xvi. The extinguishing system shall include the following components:

- Agent storage container with cylinder valve, pressure gauge, Low-pressure Switch
- FM-200 agent
- Discharge nozzle(s)
- Solenoid valve(s) and Pneumatic Actuator(s)
- Manual Actuator(s)
- Mounting brackets
- Discharge hoses
- Check valves
- Inter-connecting Actuation hoses
- Manifolds and piping with fittings
- Any other required for the completeness of the system

xvii. The FM-200 discharge shall be activated by an output directly from the `FM- 200' Gas Release control panel, which will activate the solenoid valve. FM-200 agent is stored in the container as a liquid. To aid release and more effective distribution, the container shall be super pressurized to 600 psi (g) at 21°C with dry Nitrogen.

xviii. Cylinder valve bodies shall be brass. Any other materials of construction shall not be acceptable.

xix. The releasing device shall be easily removable from the cylinder without emptying the cylinder. While removing from cylinder, the releasing device shall be capable of being operated, with no replacement of parts required after this operation.

xx. Upon discharge of the system, no parts shall require replacement other than gasket, lubricants, and the FM-200 agent. Systems requiring replacement of disks, squibs, or any other parts that add to the recharge cost will not be acceptable.

xxi. Systems containing components that have a dated life span and must be periodically replaced shall not be acceptable.

xxii. The releasing of FM-200 Cylinder(s) shall also be possible through direct mechanical actuation, providing a means of discharge in the event of total electrical malfunction.

xxiii. The manual release device fitted on the FM-200 Cylinder(s) shall be of a manual lever type and a faceplate with clear instruction of how to mechanically activate the system. In all cases, FM-200 cylinders shall be fitted with a manual mechanical operating facility that requires two-action actuation to prevent accidental actuation.

xxiv. FM-200 storage cylinder valve shall be provided with a safety rupture disc. An increase in internal pressure due to high temperature shall rupture the safety disc and allow the

content to vent before the rupture pressure of the container is reached. The contents shall not be vented through the discharge piping and nozzles.

xxv. FM-200 containers shall be equipped with a pressure gauge to display internal pressure.

xxvi. Brass Discharge nozzles shall be used to disperse the `FM-200'. The nozzles shall be brass with female threads and available in sizes as advised by the OEM system manufacturer. Each size shall come in two styles: 180° and 360° dispersion patterns. The nozzles provided shall be UL listed or VDS/LPC approved.

xxvii. All the Major components of the FM-200 system such as the Cylinder, Valves and releasing devices, nozzles and all accessories shall be supplied by one single manufacturer under the same brand name.

xxviii. Manual Gas Discharge stations and Manual Abort Stations, in conformance to the requirements put forth in NFPA 2001 shall be provided.

xxix. Release of FM-200 agent shall be accomplished by an electrical output from the FM-200 Gas Release Panel to the solenoid valve and shall be in accordance with the requirements set forth in the current edition of the National Fire Protection Association Standard 2001.

xxx. Acceptance Tests: Acceptance for the System installation, inclusive of the piping and requisite cabling shall be strictly in accordance with the installation acceptance guidelines as put forth in the NFPA 2001. The bidder shall be required to carry out a simulation test [with the Electrical Solenoid on the FM200 bank (/ Cylinder) disenabled / disengaged so as to prevent discharge of gas], and prove the functionality of the System.

xxxi. A Gas dump test is outside the purview of this specification, due to commercial considerations, and as the guidelines put forth by NFPA 2001.

e. System Consideration and Requirements

System Drawings

The Bidder shall specifically prepare plans, which are to an indicated scale with lettering no smaller than one-eighth inch and easily reproducible. These plans will show the quantity, location, and marking of all system components. Included shall be a description and routing of all piping. Computer flow calculations using the manufacturers approved software shall detail pressure changes, flow rates, pipe and nozzles sizes. Care should be taken to locate all agent storage containers as close to the protected area as possible to ensure complete liquid discharge of the suppression agent within 10 seconds. System electrical schematics and diagrams shall be provided, including a description of all interlock functions.

f. Codes and Standards

NFPA 2001 standard on Clean Agent Fire Extinguishing System Clean agent manufacturers recommendation.

X. Access Control System

a. General

The intent of this document is to specify the minimum criteria for the Design, Supply, Installation, and Commissioning & Maintenance of Access Control System. The work under this system shall consist of design, supply, installation, testing, training & handing over of all materials, equipment's and appliances and labor necessary to commission the said system,

complete with Door controller, Proximity card reader, Electromagnetic locks, Magnetic contact and Emergency release switch. It shall also include laying of cabling, necessary for installation of the system as indicated in the specification and Bill of Quantities. Any openings/chasing in the wall/ceiling required for the installation shall be made good in appropriate manner. The software for the Fire alarm, Access control and CCTV system shall run on a single platform. The specification for the same is provided along with the fire alarm system and vendor shall comply point-wise on the requirement.

b. Scope

The scope of work shall include the design, supply, installation, commissioning, integrating, guaranteeing and maintenance of an integrated access control system.

c. Operational Requirements

The Access Control System (ACS) as outlined in the tender document shall be used to control the flow of authorized personnel through the secured access area of the facility. Individual access cards shall be issued to all the authorized employees. The system shall authorize entry into the Server Room and NOC area only after the card read by the smart card reader is validated with respect to door, time & day of the week. For authorizing an exit, the system shall verify the validity of the card read by the reader and release the door lock.The document shall provide an outline of the various parameters that are specified, as minimum requirements, with respect to various hardware & software components required for the implementation of an integrated security & access control system. This document together with the detailed schedule of quantities for the site forms the basis for the tender issued.

d. Access Software Features & Requirements

General Description

i. The Access control system software shall be a module in the integrated software. The Access Control System software shall be capable of integrating multiple functions including Access control, Time and Attendance Management of employees, Alarm Management, Database Partitioning, and external system database sharing of employee personal information (Import Utility).

ii. The system shall be modular in nature, and shall permit expansion of both capacity and functionality through the addition of control panels, card readers, software modules and sensors.

iii. The system shall incorporate the necessary hardware, software, and firmware to collect, transmit, and process alarm, tamper and trouble conditions, access requests, and advisories in accordance with the security procedures configured. The system shall control the flow of authorized personnel traffic through the secured areas of a facility.

iv. The user interface at the host computer (server) and at the UWS (user workstation computers) shall be a mouse driven graphical user interface (GUI) allowing the user to open and work on multiple windows simultaneously.

Glossary of Terms - The following terms are defined for the purpose of this specification:

Card Profile - A logical group of doors which may be connected to one controller and which represent a collection of readers for which a particular cardholder may have access privileges.

Acknowledge - The action taken by an operator to indicate that he/she is aware of a specific alarm or tamper state.

Process – The action taken by an operator to indicate that he/she is satisfied that the alarm has been attended to and can be cleared from the screen.

Alarm - A change of state as sensed by the ACS Software indicating that the ACS Software has detected a condition, which its sensors were designed to detect.

Badge - The physical card, carried by the Cardholder used to gain access through a door by presentation to a Card Reader.

Cardholder - A person who is a member of the Cardholder database and may or may not have been issued a valid badge.

Card Reader - A device usually located at access points, designed to decode the information contained on or within a badge for the purposes of making an access decision or for identity verification.

Download - To send computer data from one sub-system to another; for example, to send a cardholder database from the ACS Software server to a controller for the purposes of making access decisions without the intervention of the host PC.

Facility Code - A coded number, in addition to the individual card number, stored within each card key, which uniquely identifies the facility at which the card is valid. This feature prevents cards from one facility from being used at another facility that has a similar Security System.

Server - The central computer that serves as the common point controller for the remote user workstation terminals, as an alarm monitoring and control workstation, as a point of integration for related sub-systems, and as a central data base server.

Line Supervision - The monitoring of an electrical circuit via electrical and software systems to verify the electrical integrity of the supervised circuit.

Off-line - A condition in which a controller(s) is not in communication. In the off-line mode, the controller continues to make access decisions and process alarms according to the information stored at its local database.

User Workstation (UWS) - a personal computer connected to the ACS Software server computer via local area network connections for the purpose of operating the system and responding to alarms.

Password - A combination of numbers and/or letters unique to each ACS Software operator.

Reset - A command or feedback signal that indicates that a monitored point has returned to its normal state after having transferred to the alarm or trouble state.

Armed - The normal state of an alarm input point in which it will be monitored for change of state, which would indicate that it has transferred to the alarm state.

Secured Area - A physical location within the facility to which access is controlled by one or more card readers.

Tamper - A condition within the circuitry of a monitored point, which indicates that the electrical integrity of that sensing circuit has been compromised.

Time Zone - A user programmable period made up of days of the week and hours of the day during which events such as valid card grants and Input/Output linking events may occur.

User Definable - An attribute of an ACS Software function which may be easily tailored by the Operator without the need for computer programming knowledge or experience.

e. Software Architecture

i. **Server -** The ACS Software Server shall be configured to be located at the Central integrated software. The ACS Software server shall operate on Windows XP/Vista/ 2008/or latest version Server Platforms. The Server shall consist of various managers that

are assigned specific functionalities logically grouped together and shall control all access to the database. The ACS Software Server shall be designed for unattended execution and should not have any user interface.

ii. **User Workstation -** The UWS shall be dedicated to act as a card issue terminal/System Monitoring/Administration Station. The UWS shall be connected to the ACS Software Server over a dedicated Ethernet LAN/Internet. The UWS shall provide the GUI in the familiar windows point and click environment for easy maneuverability. Various configurable parameters shall be logically grouped and shall be available in various consoles. Workstation is to be provided by RITES and necessary work is in the scope of Bidder.

f. System Architecture

ix. General - The Access Control System Management System (ACS Software) shall use a Client Server architecture based around a modular PC network, utilizing industry standard operating systems, networks and protocols. The system shall allow the distribution of system functions such as monitoring and control and graphical user interface etc. across the network to allow maximum flexibility and performance. The architecture shall include support native Ethernet LAN / WAN using standard hardware and software to link nodes into a single integrated system. The network protocol used shall be industry standard TCP-IP / UDP

x. Software features - The software shall have a capacity to accommodate the following based on licensing

A central database on the server able to support up to unlimited badges

- Unlimited number of card profiles.
- Unlimited number of operators.
- Central on-line data storage of historical transactions, expandable as system resources allow.
- 255 levels of alarm priority
- Multiple badge numbers per cardholder. Each badge can be tracked separately.
- Multiple issue levels per card, only one of which shall be active at any given time
- Fifty user-defined cardholder fields. The system shall be capable of reporting on any or all of the user-defined fields. Each user-defined field may be defined by the user as alphanumeric, numeric, or Text List.

Support all time zones with 2 on & 2 off periods. And 3 set of times corresponding to 3 security levels.

- Anti-pass back feature support.
- Door open time set for each door.
- The time in and time out is calculated on the first in and last out basis.
- Supports day and overnight shifts.
- Overtime calculations.
- Detailed data entry fields in employee master.
- Employee master maintained for various locations/branches.
- Employee code up to 8 digits.

- Employee master maintained for old employees on location basis.
- Photographs can be stored for each employee.
- Manual Entries
- Out door duty entries
- Tour entries Department types, employee types, grades, locations maintained.
- Grace time for different grade types.
- Backup and restoration facilities for employee master and swipe data.
- Reports on employee master and time and attendance.
- Login and authority rights to the software can be set for each user.
- Leave system set on calendar or financial year or any month of the year.
- Pro-rata calculation of leaves. Leave register maintained for CL, SL, PL and other leaves.
- Maternity and marriage leave setup.
- Carry forward of previous years leave.
- Leave encashment facility.
- Various leave related reports.
- Employee Leave card status.
- Backend Database: ODBC compliant
- Data can be stored on a central database server.

Front end: GUI based user-friendly interface based on client server technology for Windows 2000/XP/2003 Server environment.

Third party interface: ASCII flat files with coma separated values as per requirement

Architecture: 3 Tier (User, Business & Data services) to ensure scalability

Operators: Unlimited

Configuration: Full set up & programming of all door controller functions Card

Database: To contain Photo image of cardholder along with other relevant data.

Card profiles: Unlimited with respect to single card or batch of cards. Shall define valid doors, 3 time zones per card applicable to weekday, off day & holiday

Archival: Daily automatic archival based on defined time.

Reports: User definable access reports with respect to time, Date, door & card. Daily Attendance reports based on 1st IN & last OUT. Reports should also include archived data.

Door Control: Each Door individually or all door simultaneously may be locked / unlocked or normalised from the PC.

Roll call: The software shall be able to provide the no. of list of card holders in the premises. It shall also be capable locating an user based on the last transaction.

xi. Operator Interface Characteristics - ACS Software shall provide a Windows operator interface as standard. No custom programming or scripting shall be necessary to produce the following:

Window re-size, Dedicated icons and Pull Down Menus to perform the following:

- Associated Alarm Display
- Alarm Summary
- Alarm Acknowledgement
- Graphic Call-up
- Card Holder Detail
- Alarm Banner showing priority
- System Date
- Current Operator

xii. Operator Functions

The following functions shall be performed through the operator interface:

- Display and control of door control units
- Acknowledge alarms on a priority basis Initiate printing of reports
- Archive and retrieve event logs
- Change own password
- Monitoring of data communications channels
- Configure system parameters

xiii. Operator Security

Security - Each operator shall be assigned a user profile that defines the following:

- Operator Identifier or User Name
- Unique Password
- Partition
- Workstation Access
- Password expiry parameters
- Any actions initiated by the operator shall be logged in the Event database by operator identifier.

Area Assignment / Area Profile - Each operator shall be assigned a specific area of the building with the appropriate monitoring and control responsibility (no view, view only, alarm acknowledge only or full control). An area shall be defined in this context as a Partition. This in turn may represent a physical space in the building. This can be used to partition the database in such a way as to assign operators control over certain areas and prevent unauthorized access to other areas.

xiv. Standard System Displays - The ACS software shall be capable of storing a number of graphic displays (maps). The quantity of such maps shall be limited by available hard disk storage space only. Display maps) are layered i.e. lower level maps associated with the top layer map existing in the system. It should be possible to navigate through the displays

(maps) layers by clicking on the sections of a map layer. The following displays shall be included as part of the system:

- Alarm Display
- Alarm Count
- Event Display

xv. System Status Displays - System status shall be displayed on all UWS and show the following parameters

- Recent alarms pending ACKNOWLEDGE
- Alarms ACKNOWLEDGED but not PROCESSED
- Communication failures
- Communication links status
- Controller status

viii. Administration Displays

The system shall provide the following consoles:

- Global Settings Console
- ACS Software Management Console – architectural and logical views
- User Management Console
- Operator Management Console
- Graphics Management Console

ix. Creating Custom Displays - Graphic Display Builder - The ACS Software shall provide a Graphics Console for the creation of site-specific graphic displays. It

shall allow one-step online building of display static objects. It is a WYSIWYG editor (what you see is what you get) allowing the displays drawn using an external editor to appear exactly, the same when viewed from an Operator Workstation.

x. Monitoring And Control- Audit trail -ACS Software shall maintain an audit trail file of operator activity, and shall provide the ability to generate a report by operator, time and date, and type of activity (audit code). The system shall allow the operator to direct the audit trail report to screen, printer, or file. The audit trail feature records:

- Site parameters modified.
- System login or logout.
- Cardholder added, deleted, or changed.
- Alarm message added, deleted, or changed.
- Communications initiated or terminated.
- Access privileges added, deleted, or changed.

xi. Cardholder Management System - The ACS Software shall store security related cardholder/pass holder information in a relational database like MS SQL Server. The access matrix shall be defined in the Card Profile. Unlimited such profiles can be created. Each profile shall also be assigned User Defined Fields. Badges shall be created in the Card Settings where each card behavior is defined. Card Profile is also associated to the card to create the access profile for each card. Card Holders are then created and card associated to them.

xii. Multi-Selection - It shall be possible for multiple cardholders to be selected and a single edit to be performed on all of these cardholders selected.

xiii. Alarm Management - ACS Software shall report alarms to the Alarm Window in the Event screen. Alarms are grouped according to the priority assigned to it. In the case where over 1000 alarms are in unprocessed state, they are not automatically retrieved. This will enable the user to attend to any fresh alarm easily. History alarms can be fetched by a manual command.

Alarm Priorities - Each alarm shall be set one of the upto 255 available priority levels.

Alarm Annunciation - Alarms shall be annunciated by: Alarm message appearing on alarm display.

Available Tone - based on a "*.wav" or other sound file for each alarm priority Alarm message printed on the alarm printer Alarm indicator flashing on the operator interface

Alarm Processing -It shall be possible for the operator to click on the alarm window and process each alarm. The following information shall be made available in the alarm details window:

- Date and Time Stamp
- Description of the point in alarm
- Location of the alarm Alarm
- Priority with total count

Response Text History of last 10 alarms from that location. It shall enable the operator to chose to bulk process all alarms in a priority. It shall also be possible to perform a multi select and process more than one alarm.

Alarm Filtering -The Software shall enable each operator to select the alarms that he/she needs to view and the system will annunciate only those alarms. It shall also be possible to set if the operator can Acknowledge and/or process such alarms. Alarms that occur within an operator's Partition shall only be reported.

xiv. Reporting - The system shall support a flexible reporting package to allow easy generation of report data. The reports provided shall include pre-configured standard reports for common requirements such as Alarm Event reports and custom report generation facilities that are configurable by the user. It shall be possible to define SQL queries in an easy to understand screen.

xv. Historical Data Archiving - The system shall support archiving of historical data to allow a continuous record of history to be built up over a period of time. Archived data shall be stored on the hard disk of the system or a remote network drive or moved off-line to removable media such as floppy disk, cartridge tape, DAT tape, or optical disk. Once archived, the data shall be made available for reporting.

g. Hardware Requirements

Node Controller

The Node Controller shall be a fully stand -alone processor capable of making all the access control decisions without the involvement of a host computer.The Connectivity to the Host computer shall affect only the data logging and online configuration capability.

The node controller shall have 32 bit dual processor architecture to perform the main functions and auxiliary functions. The node controller shall have a built-in Real Time Clock (RTC),

Calendar, Complete database stored locally and shall be capable of operating offline on standalone mode.

The Node controller shall mean the intelligent control unit that shall be used to process & manage the entry & exit transactions through each of the access controlled points, which may be doors (with electromagnetic locks) or other forms of pedestrian / vehicle barriers.

Each access-controlled point shall have one dedicated node controller. Failure of one controller shall not affect the operation of more than four readers, while the rest of the system shall continue to function without any reduction in the functionality.

The node controller shall store in its memory all the system parameters & card databases and shall be virtually independent of the host computer for its regular operations. It shall also update the host computer of the card entry / exit transaction data with time & date stamp when the network is online. If the network is off line, the node controller shall store such data in its internal memory & transfer the same to the server automatically as and when it comes back on line.

The memory of the node controller shall be adequate to hold 1,000,00 events and 100 card holders in buffer. It shall be possible to have In System Programming to modify/upgrade application programs of the controller from a PC through the LAN/WAN/TCP-IP interface. Controllers not capable of In System Programming through LAN/WAN/TCP-IP interface are not acceptable.

Functions provided by controller shall include but not limited to the following features

- Provides Central Control for all Devices attached
- Makes a decision for access
- Responds to monitor activity
- Receives input to control its decision-making
- Reports activity to other devices.

The Controller shall have an on-board Web server for configuration with SSL support enabling it to be networked via LAN/WAN. Controllers shall also have RS-485 4 wire for peer to peer networking. Controllers having only RS485/422/232 connectivity and requiring external device servers for TCP/IP connectivity are not acceptable.

Tamper switch shall be attached to the inner surface of the controller enclosure. The tamper switch shall change state whenever the enclosure gate/door is opened and shall cause the controller to signal host of the condition.

The Controller shall have an on-board memory of minimum 88 MB (SD RAM and Flash memory combination) to store controller's application programs. The Controller database, time clock, operator entered database and transaction history shall be backed up by an on board power source which shall allow retention of data for 6 months with no external power supply being available.

The controller shall monitor AC mains fail, low battery, Reader supply fail, Lock supply fail and a firmware watchdog, which shall reset the controller in case of malfunction. The controller shall have an integrated low battery shutdown capability. A Peer to Peer Communication network shall be available for a communication channel between controllers independent of the Host Computer. This shall be used to achieve functionalities such as global anti-pass back and effects across node controllers.

The controller shall support different types of wiegand / Clock & Data card readers like Magnetic, Proximity, Smart card readers and Biometric readers and shall also be capable of supporting Smart card reader on bidirectional serial interface bus. Alarm Monitoring and Output Control: The controller shall have minimum 22 programmable supervised inputs and minimum 7 programmable outputs.

The 22 programmable inputs for door position sensor, Lock Status sensor, Door release switch, Emergency door lock input, Emergency door open input, tamper reader, box, external inputs (supervised.) NO/NC type. The controller shall have in addition to the 7 (minimum) programmable outputs, dedicated outputs for the following. The output type shall be momentary/ Continuous/ pulsed.

- Valid Output (When the access is granted)
- Void Output (When the access is denied)
- On-board buzzer Output (To provide local audible annunciation)

The node controller shall have the following system status LED's

- System LED/Power On LED
- PC network transmission On LED
- PC network receiving On LED
- Peer to Peer network transmission On LED
- Peer to Peer network receiving On LED
- Door Open/Close LED (Lock status)
- Auxiliary Output 1 status
- Auxiliary Output 2 status
- Auxiliary Output 3 status
- Processor operating
- LAN status
- LAN connection status

It shall be possible to assign a card with respect to the following card types:

Normal user shall be given access to specified doors as per the specified time zone attached with respect to the day of the week.

Super User shall have no restriction to any door except door locked by exception

Patrol user shall access specified doors as per the attached tour sequence. This card when presented shall disarm the inputs associated with the controller for a definite time. Time sequence shall be programmable in PC.

Visitor shall be allowed on visitor-enabled doors only

Duress card when presented shall open the door but transmit a silent alarm to the Host computer.

Maintenance card when presented shall open the door only during the maintenance time zone but shall leave the door unlocked until the expiration of the time zone or until the card logs an exit.

Custom Option: It shall be possible to create customized criteria for user if required.

It shall be possible to set up to 16 card attributes in the controller to enable higher levels of security to the premises like the following.

i. Escort: Card set with this attribute shall allow other cards through doors set with Escort request.

ii. Custodian: card set with this attribute shall be the custodian of an area Custodian should be 'IN' before any cardholder (except super user and patrol) is allowed entry. For one area any

number of custodians may be defined. Custodian shall be the first person to enter the premises and the last person to leave.

iii. On Trace: Card set with this attribute when used shall generate an alarm at the Host computer and shall trigger a local output if required.

iv. Disarm Alarms: Card set with this attribute shall disarm the inputs when they are in the armed condition.

v. Asset Release: Card set with this attribute shall provide an output to cancel a potential alarm from the asset tagging system.

vi. Transaction Limited: Card set with this attribute shall be given access for a specified number of transactions as predefined

vii. Valid / Void: Card set with this attribute shall be allowed/disallowed as per the specified doors as per the specified time zone attached with respect to the day of the week.

viii. Pin bypass: Card set with this attribute shall not be required to enter a PIN (on doors having Card + PIN readers)

It shall be possible to set the 16 programmable door attributes to the controller to enable higher levels of security to the premises.

i. Open / Lock / Control Access: Door set with this attribute shall be permanently opened / locked / or in normal operation as set by the PC

ii. Card / Card + Pin / Pin only: Door set with this attribute shall look for card only or card + pin or pin only as set by the PC

iii. PIN on Exit: Door set with this attribute shall check for Pin on exit as well.

iv. Dual Occupancy request: Door set with this attribute shall look for Dual Occupancy. There shall be a minimum of two occupants who should be present in the premises. If the first person presents the card, LED shall start blinking and ask for a second card. Access shall be granted after a second valid card is presented. For subsequent cards entry shall be as usual. At the time of exit, last two persons shall have to leave simultaneously.

v. Escort request: Door set with this attribute shall look for a second card with escort attribute if the card presented does not have escort attribute.

vi. Custodian: Door set with this attribute shall be accessed, only by the custodian of the premises initially and thereafter anybody can access the door. The custodian should be there until all persons leave. Custodian card shall leave only when all cards have exited.

vii. Maintenance mode: When a card with maintenance attribute if presented at a door set with this attribute, the door shall remain open for a predetermined time (Attached to a time zone) for maintenance purpose. The door shall lock after the duration or after the card logs an exit

viii. Transaction countdown: Door set with this attribute shall look for transaction – limited cards and when such cards are presented the transaction shall be counted from a predetermined count.

ix. Timed anti pass back: Door set with this attribute shall not allow second Entry of a card for a pre-determined duration.

x. Logical Anti pass back: Door set with this attribute shall not allow entry unless prior exit is logged in and vice versa.

xi. Global Anti pass back: Door set with this attribute shall flag all the other doors in its group regarding an entry or an exit of each card. The entry/exit through any one door in the group

shall be reflected on all the doors within the group.

The Node Controller shall support 99 time zones for each security level and each time zone shall have 2 ON & 2 OFF periods and 3 set of times for 3 security levels. If a change in security level is required, a Level shall be broadcasted through the network for all the time zones to change accordingly. Three security levels shall be provided for each time zone.

Readers Proximity card reader

The proximity card reader shall mean the card reading device, connected to the door controller. The unit shall be capable of reading the card without physical contact & hence the name proximity card reader. The card reader shall only read the card data & pass it on to the door controller for validation. The card reader, on its own shall not take any decisions. The reader shall have an approximate read range of minimum 3" when used with the compatible access card. The reader shall require that a card, once read, must be removed from the RF field for one second before it will be read again, to prevent multiple reads from a single card presentation and anti-pass back errors.

The Reader shall be made of UL94 compliant polycarbonate material and shall be suitable for mounting in outdoor environments also. The reader shall be capable of reading the card and transmit that data in Wiegand format to the controller. The Reader shall have audio-visual indications, which shall be controlled by the node controller.

Proximity card

The proximity card shall mean the access card that is capable of being read without a direct contact by the proximity card reader. The proximity card shall carry the facility code & the card number. The card numbers shall be unique to each card & the systems at each facility shall permit access only to select card numbers, based on the programming. The card shall be Unaffected by body shielding or variable environmental conditions. Use with a strap and clip as a photo ID badge. The Card shall allow direct printing to the card with a direct image or thermal transfer printer. The card shall require no-battery to operate. The card shall be capable for a minimum of 100,000 reads. The Card shall support multiple read ranges when used with different types of readers. The card shall support a minimum read range of 3" for normal door applications.

Electro Magnetic Locks - The Electro Magnetic Lock (EML) shall mean a locking mechanism that works on the principle of electromagnetic attraction. The EML shall be installed single swing flush doors. They shall be fail - safe, in case of failure, shall allow the door to be opened freely. The door controller shall control the EML.

Emergency Release Switch - The emergency release switch shall be of break glass type, similarly to manual call point and shall be green in color. In case of any emergency the glass shall be broken which shall cut-off the power supply to the electro magnetic lock.

Magnetic Contact - The magnetic contact shall be of flush / surface mount type. The contacts shall be corrosion resistant and completely hermetically sealed. 5 million cycles of operation shall not affect the contact.

XI. CCTV based video surveillance system

The work under this system shall consist of design, supply, installation, testing, training & handing over of all materials, equipment's and appliances and labor necessary to commission the said system. The CCTV System shall comprise of fixed dome Cameras and out door PTZ Cameras with DVR and power supply units, monitoring stations. All recording shall be done in Digital video recorder through CCTV camera network. It shall also include laying of cabling, necessary for installation of the system as indicated in the specification and Bill of Quantities.

Any openings/chasing in the wall/ceiling required for the installation shall be made good in appropriate manner.

System Design and Architecture

CCTV system should be designed such as to cover the strategic locations and sensitive areas of High end cameras with Day/Night features to be installed for outdoor and perimeter security application, these cameras shall be IR Compatible so that IR Lamps can be introduced at a later stage to enhance night vision. All Speed domes shall be rugged and shall be weather proof as per specifications. The fixed dome cameras shall necessarily be of Varifocal / fixed lens as per detailed specifications. Day/Night Cameras with built in Varifocal lenses shall be provided for select indoor/outdoor locations as per the detailed Bill of Material. Also the systems should utilize only industry standard protocol. System should be programmed such that operator's intervention if required shall be minimal and the system should provide features like guard tours, preset positions and the preset positions will be linked to perimeter protection system/intrusion system in future. The DVR's/NVR's should allow for recording of events both continuous and motion triggered as per requirement and recordings should be able to create evidences and support post event analysis.

Fixed Dome Camera

The Dome camera unit shall be 1/3" CCD type Color and shall provide a minimum of 480 TV lines resolution or better. It shall be possible to use lenses of 3.6 mm focal length. The complete unit shall be housed in a dome and base unit, both preferably made from injection mounded plastic. It shall be possible to adjust the camera head inside the dome in both the planes so that it can be wall or ceiling mounted. The camera shall operate on 12 volts D.C.

The Camera shall comply with the enclosed datasheet.

CCTV camera should have dynamic IP support with Tilt and Pan facility(360 Deg view)

Technical Specifications of Fixed Dome Camera

Image Sensor	1/3"
Effective Pixels	PAL: 752 (H) x 582 (W)
Scanning System	2:1 Interface, V 50Hz, H 15.625 KHz
	2:1 Interface, V 60Hz, H 15.750 KHz
Resolution	480 TV Lines or Better
Minimum Illumination	0.1 Lux
White Balance	Auto Tracking 2500*K - 9500*K
Back Light Compensation	Auto (center area)
Gain Control	Auto AGC
Shutter Control	AES: 1/50 (60) - 1/100,00 sec.
S/N Ratio	more than 48dB
Gamma Correction	0.45 or Better
Lens	Built-in Fixed Lens 3.6 mm. 2.5, 4, 6, 8 & 12mm (optional)
Operating Temperature	+10* C to +45* C

Power Supply	DC 12/24V DC
Model No.	To be intimated by the Bidder

PTZ Outdoor Camera

Specification	Detail
Camera Specs	Image device 1/4type Exwave HAD CCD Number of effective pixels 768 (H) x 494 (V) Zoom ratio Optical x 18 (x 12 Digital Zoom) Focal length f=4.1 - 73.8mm F Number F1.4 (Wide end), F3.0 (Tele end) Iris Auto/Manual (F1.4 - close) Minimum object distance 290mm (Wide end), 800mm (Tele end) Pan range - 170° to +170° Tilt range - 90°. to +30°, 120° degrees total tilt range Other functions Day/Night (Auto/Manual), Image Flip function, Motion Detection
Image Size	For both JPEG and MPEG 4 640 x 480(VGA), 480 x 360, 384 x 288, 320 x 240(QVGA), 256 x 192, 160 x 120 (QQVGA)
Compression format	MPEG4 / JPEG (Selectable)
Maximum Frame Rate	JPEG: QVGA: max.30fps, VGA: max.18fps MPEG4: QVGA: max.30fps, VGA: max.15fps
Analog video Output	Composite video (1Vp-p)
Horizontal Resolution	more than 470 lines
S/N Ratio	More than 50dB
Minimum illumination	0.7 lx(AGC ON, F1.4, 50IRE) 0.05 lx (F1.4, 1/4 sec) color mode 0.01 lx (F1.4, 1/4 sec) b/w mode
Dimensions	140 x 203.7 x 148 (W x H x D, mm)
Power requirement	AC24V, DC12V
Power consumption	max. 18W
Operating Temperature	0°C to +40° C (32° F to 104° F)
Storage temperature	20° C to +60° C (-4° F to 140° F)
Operating humidity	20 to 80%
Storage Humidity	20 to 95%
Operating System	Windows Vista/ XP / 2000/Latest Windows version

Video Recorder

The Digital Video Recorder (DVR) shall be a Windows XP Embedded operating system with the functions of a recorder and multiplexer into one unit, having no tapes to maintain, replace or rewind. The embedded operating system shall result in increased stability and reliability and journaling file system allow for quick recovery in case of power interruptions. The DVR shall

be provided with external UPS for further stability. It shall have hardware and software watchdogs to monitor system operations. The DVR shall have manufacturer support on revision control on the hardware for 5 years from the date of manufacturing.

System Architecture

The DVR can be placed on a shelf or desktop for easy access to the front panel control for operation with 4,8,16 camera configuration options. The recorder should include versatile multiplexer functions that allow live and recorded image from the 4 camera inputs to be shown on the monitor in a single camera, four camera, and displays. It should also be possible to view live camera while recording.

It shall have one VGA output for multiplexed viewing on GUI and one analog output for spot monitoring.

Video Compression

The video compression should produce high resolution with play back. The System should have five user selectable image quality settings. The DVR should have a built in large volume 250 GB hard disk for both high reliability and high speed operation. Users should be able to select from 1 to 30 frames NTSC and 1 to 25 frames PAL by camera. The maximum recording frames per second shall be 480 frames NTSC & 400 frames PAL.

Recording

Recording shall be user MPEG4 & the Time lapse recording adjustable by camera minimum of 1 frame every 10 seconds to maximum of 25 PAL or 30 NTSC. Recording speed shall increase automatically to maximum frame rates on event of alarms. System shall automatically proportion the available frame rates among cameras or user shall be able to assign different frame rates to each camera. The recording resolution of 320 x 240 or 640 x 480 NTSC and 352 x 288 or 704 x 576 PAL shall be available by camera. Recording shall also be triggered by motion detection with user definable sensitivity levels, and nine motion grids for each camera. Pre recording and post recording on event or alarm set by camera shall be available. Shall be provided with one channel audio recording and should be upgradeable to 16 audio inputs on request in the future. The compression shall be MPEG4 for storage and network transmission and shall have on-the-fly compression level adjustment on transmission.

Play back

Shall be able Search recorded images single or multiple cameras. Shall have the ability to search by date, time and/or event. The alarm events shall be color coded by time for easy and quick access. On play back it shall have the ability to do digital zooming on the whole image or by selecting specific area on the screen.

Smart Search

Shall have SMART SEARCH facility, it should be motion based video detection and recording.

Alarms

It shall have 8 inputs to trigger alarm recording with 4 outputs to drive external alarm devices. Alarms shall be activated manually or by event and associate any number of alarm devices with any cameras. Shall automatically with out any operator intervention on event and alarm send out E-mail that attaches an image of the event or alarm in JPEG format. These Alarm Inputs shall be taken from the BMS system to activate instantaneous recording, depending on Fire Zones. All activities including system, sensor, and motion and user activity shall be logged in the system automatically. It should be possible to record continuously or at a scheduled time periods. Search on recorded pictures shall be played back single or multiple cameras and shall

have ability to search by date, time, event (alarm). All the alarm and events should be color coded by time for easy and quick search by the user.

Video Export

The recorded images shall be exported in JPEG format with Digital watermark and also as AVI format for motion pictures. It shall have an inbuilt image authentication

menu for picture verification. The storage medium shall be internal hard disk or external Firewire, USB drives.

The DVR shall have internal DVDR/CDR for easy back up. Also the network capability shall allow the images are stored in the network devices which shall be done manually or pre defined schedule time periods to the ease of the user. During the back up the user shall be able to backup selected camera, date, and time as per requirement.

Remote Monitoring

The DVR shall be provided with Remote Client software, which shall run on any TCP/IP network with Multiple DVR's addressable by IP addresses. Remote client shall be able to connect up to 32 DVR simultaneously and display the pictures. The DVR settings shall be locally and remotely configurable with user level name and passwords.

It shall have facility to create Guest users with restriction to view only authorized cameras. The images shall be transmitted over the network in compressed format providing safe communication and reduction of load on the network. It shall have multiple password control levels – Settings, System Shutdown, Search, Network Access, and Backup. It shall have administrator, user & guest level access to the system. The DVR shall be Web enabled so that it can be accessed to view live images by using an internet explorer by entering the IP, user name and password.

The display screen with 16 segments shall have each segment for a specific DVR and shall display the selected camera on the window or switch between selected cameras within the same window in a sequence. Or from a single DVR it shall be able to display all the sixteen cameras on a single screen. From the central monitoring location the security officer shall be able to establish a two way voice communication to the specific DVR location through the same remote client software.

The DVR shall be Web enabled to allow clients to access the DVR using a standard Internet Explorer software for remote monitoring & control functions based on security parameters. Also the remote connectivity time out shall be programmable in minutes on the DVR to disconnect the users after a specified period of time after log in. This shall be used to prevent unnecessary traffic on the network.

XII. Automatic water Leak Detection system

This specification shall be the guideline for Supply, installation, testing and commissioning of Automatic Water Leak Detection System.

General Specifications

The Water leak detection cable shall be the sensor cable typically used to detect water leaks in the sub floor and above false ceiling areas. The Cable shall be capable of water detection over its entire length. The construction of the cable shall be of PVC Twisted pair, with SS 316 elements, of diameter not exceeding 3.5 mm. The Cable shall draw excitation signal from a start of the line module. This module shall serve as the interface between the Water leak detection panel and the Sensor Cable.

The Start of Line Interface Module shall be locally placed in the False Flooring of the Server area(s), and shall be connected to the WLD Panel through standard 2 c x 1.0 mm2 Cu flexible Cable, PVC insulated, PVC Sheathed Cable. The WLD Panel shall be capable of supplying power to the interface modules, and shall serve as the annunciator of alarms through facia mounted zonal LEDs. The panel shall activate sounders programmed Zone wise. Testing procedure shall involve physical application of a wet cloth to the cable, to test the relay operation. The Panel should sound the Alarms, and notify the BMS system.

XIII. Rodent Repellent System

The work includes Supply, Installation, testing and commissioning of Rodent Repellent System using Electronic transmitters of high frequency sound waves, which will emit sound at very high decibel levels painful to pests, as described in the specification given hereunder.

SYSTEM

The system shall consist of a Master Console VHFO, satellites and its cable circuits. **Very**

High Frequency Oscillator (VHFO)

These will be Electronic transmitters of high frequency sound waves (well above the 20 KHZ frequency which is the upper limit of the hearing range of the human ear.) emitting sound at high decibel levels (sound pressure) that is audible and painful to pests, but inaudible and harmless to humans. The VHFO system will consist of one Master Console and twelve Satellites / Transducers. The Console will be installed in the control room, or as directed and the satellites in the floor areas as required. The powerful sound waves generated by the satellites of VHFO shall be within the hearing range of many pests, and cause them pain and discomfort. VHFO' s satellites should be quiet and inaudible to humans.

Satellite

Each satellite will cover an open floor area of approximately 200 sq ft, and max. 300 sq ft for an average height of the ceiling at 8 to 10 ft. The satellites should

- Be able to mount in any angle to match the décor.
- Possible to install in sensitive areas.
- Should withstand high temperatures in false ceilings, and low temperatures in cold storages and air locks.
- Should not require a power connection.
- Should be able to test on an audible range with the help of a self-testing facility or any other suitable means.

Technical information a.

Satellites

- Crystal
- DM 44T 24V MAS Germany
- Frequency
- Peak frequency responses of the satellites are
- 21.6 KHz + / -3 KHz
- 31.6 KHz + / -3 KHz

- 50.4 KHz + / -3 KHz
- 60 KHz + / - 3 KHz
- 1.2 Nature of sound waves

The sound waves propagated should be linear sine waves with constantly varying frequencies.

- Operating environment
- Range of –4 deg C to 60 deg C, 100 % humid environment and also under water.

b. Circuit

Signal generator should have full wave rectification, regulated 12V DC power supply to withstand power fluctuations ranging from 170V AC to 270V AC. Amplifier should have a preamplifier stage coupled with signal generator for dual transistor amplification having a push-pull configuration.

c. Pressure

Uniform pressure output of 80 dB to 110 dB with 360^{o} transmission angle. Linear propagation of mixed / variable frequencies detectable at, or about 40 ft distance from the source (Transducer/ Satellite).

- Spatial average intensity – 83mW per cm^2

d. Power supply

5A Power Socket (230 V AC) will be provided for each VHFO as may be required. Alternatively Bidder to specify the required power and the no. of Power Sockets required for each unit for both Rodent.

e. SPECIFICATIONS

Operating frequency	: Above 20 KHz (Variable)
Sound Output	: 50 dB to 110 dB at 1.00 Mts.
Power Output	: 800 MW per Satellite
Power Consumption	: 15 Watt Approx.
Power Supply	: 230 V AC, 50 Hz
Mounting	: Wall / Table

XIV. Building Management System

General Specifications – Integrated Building Management System

The Building Management System shall be a PC-based System. It shall combine the latest state of the art technology with simple operating techniques and shall be used to control, manage alarms/reports and monitor the building services installations.

a. General

i. The Building Automation System (BMS) supplier shall furnish and install a fully integrated building automation system, incorporating direct digital control (DDC) for energy management, equipment monitoring and control, suitable for the building usage. The control strategies shall be developed to ensure that the specified environmental conditions are maintained, whilst giving due regard to minimizing of energy consumption.

ii. The system design shall utilize the latest technology in "open" network architecture, distributive intelligence and processing, and direct digital control. The BMS system offered should be from the latest offerings and should be of freely programmable management and automation stations for the full spectrum of today's building application services.

iii. All peripheral equipment e.g. sensors, pressure switches, transducers, control valves and actuators etc. shall be of the same manufacture as the direct digital control modules and outstations.

iv. The system offered shall be completely modular in structure and freely expandable at any stage from the smallest system through to large distributed systems. Each level of the system shall operate independently of the next level up.

v. The system shall fully be consistent with the latest industry standards, operating on Windows Vista, XP or later, allowing the user to make full use of the features provided with these operating systems.

vi. To provide maximum flexibility and to respond to changes in the building use, the system offered shall support the use of BACnet, LON, Profibus and Ethernet TCP/IP communication technologies.

vii. The BMS contractor shall establish the number of equipment to be controlled / monitored by the BMS from the drawing/ schedule/ specifications. This information shall be furnished to the BMS supplier. All plant and equipment requiring control and/or monitoring functions shall be fitted with all necessary interfacing equipment readable by the BMS network. The BMS contractors

shall co-ordinate and ensure that this equipment shall provide the required signals to the BMS.

b. Essential functions of system

i. The system comprises the supply, engineering, testing and commissioning of an integrated building management system by a specialist manufacturer.

ii. The essential functions of the system are as follows:

- Centralized monitoring / operation of the Data Center.
- Dynamic and Animated Graphic details of data center and building
- Early recognition of faults
- Faults statistics for identification
- Trend register to identify discrepancies, energy consumption, etc.
- Optimum support of personnel
- Control optimization of all connected electrical and mechanical equipment
- Prevention of unauthorized or unwanted access
- Own error diagnosis integrated system
- Auto generated SMS for critical event / alarm

c. General system Architecture

i. The system shall be logically structured into three distinctive levels, which are Management Level, Automation Level, and Field Level. Each level shall be autonomous from the other. Peer to peer communication shall be possible on all system levels and the system design shall be modular in structure to allow

straightforward extensions.

ii. Management Level

The head-end management and operation of the data center shall include process visualization, data analysis, and exchange of data with 3rd parties. At the management level, it shall be possible for communication to flow in all directions, across networks and via direct connections.

Personal computer based operator management station shall be provided for supervision and operation, alarm management, information and database management function. All real-time control functions shall be resident in the DDC controllers to facilitate greater fault tolerance and reliability. The operator management station should be capable of multi-tasking 32-bit programs by utilizing a Microsoft Windows Vista / XP/2000 operating system. The management level of the system shall consist of one, and shall be capable of handling more management station PCs and the associated software modules.

The management station shall be capable of the following:

- Display of graphical representations of the data center overlaid with live data
- High quality dynamic graphics with true multitasking of all active pages.
- Monitor and operate / influence process devices Receiving of alarm messages from the process level and directing them to the appropriate reporting device e.g. printer, pager, fax, e-mail.
- Monitor process devices for communication problems and other device faults.
- Alarm handling – all the alarms shall be displayed in a graphical tree structure in order located alarms quick and easily.
- Adjusting time strategies in the process level.
- Long term storage of logged data from the process devices
- Multi level user access control for individual access to sites, applications, functions and object.
- Display graphically the logged data.
- Custom application programming.
- Use of graphical genies to allow manipulation of data.
- The user interface shall be based on a basic taskbar, which is always visible.
- History logging for alarms, user actions, system events and messages.
- Alarm handling – all the alarms shall be displayed in a graphical tree structure in order located alarms quick and easily.

d. Automation Level:

i. General Purpose controllers shall be used for monitoring / controlling equipment which have to perform based on a customized logic, such as UPS, PAC, Electrical panel / energy meters, signals from Fire Alarm panels, CCTV, ACS, generators, transformers etc.

ii. At the heart of the DDC system shall be the Microprocessor based modules, which can be individually programmed according to the functional requirements.

iii. The automation level DDC controllers shall monitor and control the data center. The

DDC controller outstations shall be freely programmable and have the ability to perform all the routines.

iv. Process control & interlock functions.

- Generate alarms/events based on comparing measured values against known parameters.
- Time control strategies
  - Runtime tantalization
  - Trend logging of specific data-points with transmission of the logged values to the management level
  - Energy calculations

v. The DDC controllers shall be selected from either a modular or compact type of unit to suit the most economic inclusion of all the data points specified. Each control module shall be capable of operating on a stand-alone basis without control from a central computer.

vi. The input/output connection to Modular controllers shall be via individual plug-in modules suitable for the particular peripheral device. Digital input modules shall be capable of accepting control voltages up to 230vac.

vii. It shall be possible to integrate both types of control module onto the same communication network. Each controller performance shall be to 0.5% control accuracy with sample rates of less than one second.

viii. Main plant DDC controllers shall be 32 bits freely programmable. Controllers meant for VAV controls cannot be used as DDC controllers.

ix. All DDCs must be UL approved, must have an in-built real time clock and be suitable for PID control.

x. The products used in constructing the BMS management and automation levels shall conform to Open protocol for building automation and control networks.

xi. Room units shall utilize a two-wire communication link at each controller for the acquisition of room temperature and local set point. These will also provide an integral temperature/set point digital display. Up to 5 room units shall be able to use the same two-wire communication link

xii. The system shall have the facility for a Web server to be added to allow full operation of all automation station control modules connected to the communication network via a standard thin client/web browser. Functions to include:

- Display of graphical representations of the plant overlaid with live data.
- Data point display and operation of all measured values, set points, plant States, operating states and parameters.
- Alarm monitoring with acknowledgement and visual and audible alarm Indication.
- Alarm and event history.
- Alarm transmission via SMS and e-mail.
- Operation of all time schedules, exception calendar and heating curves.
- Reading of trend data with facility to export data to Microsoft Excel.
- Multi user level access protection.

- Ethernet or Modem connection

e. DDC Control Module Specification

i. The DDC controllers shall be selected from either a modular or compact type of unit to suit the most economic inclusion of all the data points specified. The DDC controllers being used should confirm to the following specifications as a minimum:

- Optional connection to operator terminal, management station and via Web browser with Web server device.
- Freely Programmable.
- Flash ROM, real time processing and multi tasking.
- 32 bit processor system, 1.5 MB program memory, No 8 bit or multiple of 8 bit.
- Supply voltage AC 24V +/-20% 50 Hz .
- Event driven data transmission.
- Automatic mains recovery
- Digital output to be 250V 2A rated changeover contacts
- Historical data memory storage
- Software application stored in non volatile memory

ii. For the generation of the application programs, the following function elements are required as a minimum.

- Reset functions
- Set point jump
- Positioning time
- P-controller (reverse or direct acting)
- P1-controller (reverse or direct acting)
- PI-controller with I-deletion (reverse or direct acting)
- PID controller (reverse or direct acting)
- 2-point controller (reverse or direct acting)
- Proportional additional sequences (reverse or direct acting)
- Data transmitter (digital or analogue)
- Data converter (analogue-digital or digital-analogue)
- Ring Counter
- Timer (switch on or switch off)
- Logic operations:
- logic "AND" (2,3 or 4)
- logic "OR" (2,3 or 4)
- logic "EXOR"
- logic "NOT"
- Comparative operations:
- Maximum values (2,3 or 4)

- Minimum values (2,3 or 4)
- Average values (2,3 or 4)
- Enthalpy calculation
- Optimiser
- Mean value calculation
- Hysteresis
- Output steps (digital or analogue)

iii. Digital outputs shall be potential free outputs. Analog outputs shall be true analog outputs (0-10 V DC)

iv. Above blocks shall be resident in the DDC Controllers and independent of any high level interfaces/controllers.

v. Further, the DDC unit software must have the following additional functions:

- Free selection of range and unit (dimension) of all signals (measured values, accumulated values, calculated values, etc.)
- Free allocation of access protection in accordance with operating priorities
- Free definition of manual override priorities (software) from operator terminal and/or management station.
- Each DDC Controller shall have a resident real time clock with a battery back up for a minimum of 4 years.
- All DDC controllers shall be housed in IP 55 enclosures with proper termination of peripheral devices at the terminal strip and not directly to the controller.

f. Remote Monitoring and Control

It shall be possible, with additional hardware if necessary, to interrogate the system remotely via the following possible methods:

- Telephone connection
- Building IT network
- Web browser technology with password access via IT networks accessing information stored on dedicated embedded web server device installed on automation controller network.
- Alarm reporting to mobile pagers/phones/e-mail etc.

g. BMS Software and Licenses

All License rights to the control systems manufacturers software packages shall be transferred to the client at the time of hand over. User Registration must be made on behalf of the client, direct to the control system manufacturer by the

specialist System House Partner. Copies of all of the control system manufacturers Monitoring or BMS software shall be provided on DVD / CD-ROM, or other mass storage device, together with copies of any graphics and databases that may be required to re-install the system after a fatal computer failure.

h. Integration of secondary systems

Integrations shall be carried out at the most appropriate level within a system, depending on the functions and interaction required. The following integrations must be possible.

- Lon Works
- Lon Mark
- BACNet /LonWorks
- BACNet/IP
- OPC
- Integration of standard proprietary buses : Modbus, M Bus.

If interaction is required between different sub-systems, the integration shall be carried out at either the automation or field level. The integration must not occur at the management level. Link to a third party software package such as a Planned Preventive Maintenance package or Energy Monitoring package shall be carried out at the management level. When sharing alarm and historical information with Maintenance Management and Energy Management packages, the management system shall provide the information in a standard commercially available format e.g. MS Access and using standard mechanisms e.g. ODBC .Real-time "live" information shall be transferred form the management system to a third party package e.g. MS Excel, either by a standard inter-application mechanism e.g. DDE or OPC or by developing a connection by using a documented API for the management system. Where a physical connection is required between a 3rd party device and the management system, the sub-system supplier shall provide the necessary line drivers and cables, documentation and support to make the connection into the device that will provide the protocol conversion.

i. Software Modules

i. The management station software shall be modular, object oriented, clearly structured and shall be based on Windows Vista / Windows XP (or later) standard 32 bit technology. The main software applications shall, as a minimum, include

Plant Viewer : Graphics based operation of the plant Trend Viewer : Logging and display of measured values Alarm Viewer : Display of alarm messages

Alarm Router : Automatic routing of alarms

Log Viewer : Logging of alarms, system events and user activities

ii. The Task Bar - The task bar shall be the 1st and last point of contact for all the interactions between user and system. In addition to obtaining quick overview of vital system information, users shall be able to click on various icons in the task bar to switch from one program to another in the multitasking operating system. In systems, which include remote sites, the task bar shall be used to switch between sites (subject touser's access privileges). To make the system easier for new users, the system shall support user-specific start-sequences with access to selected programs.

iii. Features of The Task Bar -Control of access privileges and security mechanisms for access to program modules and 3rd part software at log-in and log-out.

- User-and-password dependent access to systems and sub-systems
- Automatic user-specific start sequences
- Display of alarm and system message status, site connection status, time and date
- Facility to connect and terminate connection at various sites

- Simultaneous connection to a maximum of 4 sites

iv. Plant Viewer - The plant viewer shall support the following features :

- Hierarchically linked, animated high-resolution bit-map colour graphics (XGA 1024 x 768 pixels)
- Choice of 2D and 3D symbols with animation based on status
- Direct access to setpoints, parameters, operating modes , alarms, time-programs, on-line and off-line trend data features
- Dynamic multi-tasking with all active pages
- Monitoring and operation of plant at several levels
- Flexible operation of multiple pages using plant viewer navigation bar combined with standard handling of windows
- Navigation to all other management station software applications
- User-definable page size
- Jump tags for jumps on the same level or between levels
- ToolTips for all dynamic objects, with the option of 'User', 'Technical' or 'System' information
- Context-specific information (eg. data sheets) can be attached to any dynamic object Capable of graphics to be printed in colour or monochrome
- All 32 bit graphic file formats supported by Windows can be imported (eg> AutoCAD, PCX etc.,)
- Dynamic display of the Psychrometric chart, enabling easy simulation of the air - conditioning processes.

v. Alarms Handling & Alarm Viewer- As a minimum, the system shall support the following features :

- Operation and manipulation of alarms (based on user privileges)
- Alarm message printing
- Alarms printed independently of the management station (direct connection at automation level)
- Automatic pop-up windows for immediate display and operation of alarms (including pop-ups in 3rd party programs)
- Audible or multi-media alarm indication
- Continuous overview of all active alarms from site (updated automatically, displayed in order of priority, option of personalized view)
- Graphics based topological view of alarms
- Chronological alarm view Option of displaying detailed information
- Direct access to associated plant graphics Comprehensive filter and search criteria (time, date, priority, discipline, alarm status etc.,)
- Colour coding based on alarm priority / alarm status (screen and printer)
- Alarms for out of limit values (high, low), change of state, run-time limits exceeded etc.,

- Option of repeating unacknowledged alarms at regular intervals
- Creation of reports, with facility to print or export alarm data to 3rd party programs for further analysis
- Facility to save user-defined filter criteria
- User-specific configuration of the alarm view including on-line configuration

vi. Alarm Routing - In order to monitor alarms round – the – clock, alarm routing is an important feature of the BMS. The BMS shall have the following features:

- Routing of alarms to alarm printer, fax, pager or mobile phone
- Time schedule for each message recipient
- Alarm routing based on priority
- Alarm routing based on discipline (HVAC, Security etc.,)
- Alarms routing to person responsible at site
- Alarm
- to person(s) responsible for specific equipment or systems
- routing based on text
- Alarm routing Option of manual transmission of messages from the management system

vii. Time Scheduling - The time-scheduler shall have the following features :

- 7 day time programs
- Exception programs (local, building-wise or system-wise)
- Direct display of time programs within
- Plant viewer graphics
- Simple graphics programming of switch times
- Graphics based overview of all time programs in the system
- Graphics based overview of a 7 day program including all exception programs
- Graphics based overview of all plant points affected by a time program
- Easy creation, modification and deletion of all time programs
- Scroll features for fast access to specific weeks or days
- Storage and processing independent of management station
- Automatic synchronization of all time program in a system
- Support of different time zones
- Option of synchronization via radio clock
- Printed reports in various display forms

viii. Trend Viewer - The Trend Viewer shall have the following features

- On-line or off-line real-time data
- Simultaneous display of up to ten signals per window
- Absolute or relative time intervals

- Zoom, scroll and cursor features for faster data analysis
- Flexible, easy-to-use scaling feature with charts displayed in 2D or 3D
- Drag-and-drop feature for trend views with automatic scaling and data export
- Off-line data logging triggered manually, automatically, or on a time or event basis
- Logging and intermediate storage of off-line trend data operates independently of the management
- Automatic upload from automation level to local or remote management stations
- Management station display and archiving of on-line and off-line trend data
- Print-outs of trend data
- Easy export of data to 3rd party software
- Facility to e-port trend data directly to auxiliary programs such as ADP (Advanced Data Processing) or to 3rd party software such as MS-Excel
- Trend Viewer time base can be used directly as a filter creation in Log Viewer.

ix. Log Viewer - The Log Viewer shall be categorized into the following sections

ALARM LOG - contains all incoming alarms in chronological order

SYSTEM LOG- shows at a glance if a printer somewhere in the system has run out of paper, or a hard disk is full. Communication events are also recorded here, showing for example when communication was established or terminated

USER LOG- lists al the activities carried out by the user at the management station, unauthorized attempts, modification of parameters, set points etc.,

STATUS LOG- to check the status of all incoming messages The Log

Viewer shall have the following features :

- Storage of alarms routed to the management station
- Storage of all system messages (from printer, communications, management station, modem etc.,)
- Storage of all user activities performed at the management station
- Facility to enter and store user comments on events and activities
- Facility to display, at a keystroke, detailed information on every entry
- Extensive filter options to focus and reduce the volume of information displayed
- Comprehensive search features for fast access to information
- Facility to display an overview of data for a given day or week
- Once defined, filter and search criteria can be saved for future re-use
- Compact archiving of virtually un-limited number of entries (depending on hard-disk capacity)
- Automatic data management and archiving functions
- Facility to create and print log summaries
- Export of log entries for further analysis with 3rd party software (eg MS access)

- User specific configuration of log view can be adapted directly on line.

x. Internet Log Viewer - This is an application, which offers users even greater freedom in the management of a site. A browser such as Microsoft Internet Explorer or Netscape Navigator, for example, provides the user with access to the log database from any PC with an Internet connection. Just as with standard log viewer, the user can then obtain an overall view of all the plant and events stored or monitored by the system. The Internet Log Viewer shall be started without any special management station software on the user's PC. Access to the Log Viewer can be password protected.

xi. A Web Control - The system shall have the capability to connect to remote sites through a web control module. Individual DDC general purpose communication trunks (described elsewhere) shall have the feature to be connected to this web control module. This should facilitate viewing and controlling the DDC general-purpose controllers trunk via a remote PC / laptop. All parameters as appearing in the Portable Operator Terminal (described elsewhere) shall be available from this remote PC / laptop. The system offered shall have the facility to control / monitor the plant and equipment connected to these communication trunks via password protection.

xii. Integration of 3rd Part Software and Exchange of Data - The system shall support the use of standard interfaces and drivers that make it easy to integrate to 3rd party software directly at the management station level, or to make common use of data from the system, eg via ODBC (Open Database Connectivity). DDE (Dynamic Data Exchange) shall enable current data to be loaded continuously into a spreadsheet program such as MS Excel, so that constantly updated graphs can be created for further processing.

xiii. Object Viewer - To make operations easier, the software shall have two viewing modes.

System View > Provides hierarchical view of the system network.

User Designation View > Gives a hierarchical breakdown of user addresses based on the system database.

In general, the system shall support the following features:

- Fast navigation through the system
- Fast location of objects and alarms
- Detailed information of all objects
- Display of current values from the process level
- Modification of set points and parameters
- Users with appropriate access levels can also override outputs manually
- Two display modes > system view and user designation view Search features.
- Jump features and bookmark features as in various internet browsers Modification of users designation and alarms texts
- Customization of users addresses with a maximum of 10 hierarchical levels and up to 40 characters
- "Find" function to locate system objects.

xiv. Reports - Reports shall provide the user with the latest information from the system at specific times or when specific events occur. The following features shall be supported

l. Commissioning/Adjustment

- Reports routed on basis of time and / or priority
- Manual or automatic triggering
- User-definable or standard reports
- Facility to integrate 3rd party report programs into the management station software

xv. Access Protection - The management station shall grant access to the system only to authorized users. The system administrator shall tailor an environment to match the individual requirements of each user. The access protection facility shall define the buildings (sites) and equipment to which a given user has access, the software modules and functions available to that user within the site. The system shall support the following features

User name / password Individual access privileges covering access to sites, subsystems, program functions down to individual objects in Plant

- Viewer Up to 1000 users grouped into 100 user groups
- Automatic log – out (after period of inactivity)
- Encrypted passwords
- Network security provided by Windows.

j. Documentation

In order to have clear system documentation, the following documents have to be provided:

- System diagram
- Wiring diagram Lists of parameters
- For hand-over all documents must be up to date and provided with the date.

k. Engineering/Planning

In addition to the required, complete documentation, the service must include:

- Analysis of all functions together with the contractor
- Binding information about conditions of connection of equipment
- Scheduling and co-ordination with the contractor and design engineer

Function-oriented commissioning includes the following services, which are to be provided by BMS specialist:

- Verification of the external connections of the equipment
- Verification of the data transfer channels of the system
- Loading and testing of all basic and user programs belonging to the equipment Optimization of the control parameters

m. Electric & Electronic Related Equipments

All controls shall be capable of operating in ambient conditions varying between 0-40 deg C and 90% r.h. non-condensing.

n. Conduit Entry

All control devices shall, unless provided with a flying lead, have a 20 mm conduit knockout. Alternatively, they shall be supplied with adapters for 20 mm conduit.

o. Room Temperature/Humidity Sensor

The temperature sensor shall have sensitivities such that a change at the detector of 0.2oC from the stabilized condition is sufficient to start modulating the corrective element. The temperature sensor shall be with silicon sensor having positive temperature coefficient. The sensor shall be field wired using an unscreened cable to a base plate. The sensor housing shall plug into the base so that the same can be easily removed without disturbing the wiring connections. The protection standard shall be IP30 in accordance with IEC 144, DIN 40050. These should be generally mounted 1.5 m above the floor level. These should not be mounted near the heat sources such as windows, electrical appliances, etc. The final location shall be as per the consulting engineers' approval. The sensor shall be linear over 0 deg C to 50 deg C.

Shall operate on extra-low voltage and be suitable for mounting on Indian / British Standard conduit boxes. The humidity sensor shall be in an independent housing or be combined with the room/duct type temperature sensor in he common housing. The sensor should be electronic type with capacitive sensing element. As a minimum it should have a range of 10 to 90% RH.

p. DDC PANELS

The out-station panel housing the DDC controllers shall be located inside the conditioned area. Proper care shall be taken to ensure that there is no induction problem between the control and power cables. These panels shall be IP55 and supplied by the specialist controls supplier.

The DDC controllers located inside these out-station panels shall provide the required signals to the various equipments connected to these DDC controllers. The DDC controllers shall be capable of accepting digital input signals in the form of volt-free contacts from Motor control centers. The BMS contractor shall co-ordinate this activity.

All these outstations shall be connected with a communication bus cable and terminated to the BMS central station. The BMS supplier shall supply these bus cables. It should be possible to connect the Portable hand held terminal to be connected to any of these panels and talk to any other DDC controllers on the same bus.

Appendix-I Business Processes of RITES

ERP system will enable integration of all business processes of RITES through a single information system. This endeavour will help in inter department information sharing, communication and provide a real time picture of the overall performance of the organization. Information provided by ERP system will enable management in analytic based planning, formulation and execution of business strategies. Three major areas are identified for ERP implementation in RITES Ltd-

1. **Project Management.**
2. **Financial Management.**
3. **Human Resource Management including Corporate Services.**

Functional matrix for above three areas, have been divided into three chapters. **The functions, requirements, reports described in each chapter are only indicate and not exhaustive in nature. All the business processes and the reporting requirements of RITES Ltd. will be finalized only after Business Blueprinting.**

Chapter 1 deals with Project Management. RITES Ltd. executes various types of projects through Strategic Business Units (SBU) operating from corporate office, regional project and inspection office. Activities carried out by these SBU's can be classified, as those related to Projects and others such as training, manpower/resource planning, corporate reporting, MIS etc. Accordingly the chapter has been bifurcated into two sections, **Section I** to covers projects and **Section II** for other related activities.

RITES deals in diverse types of business segments. Section I describes the different activities of each business segment. This section is further divided into two Parts:

Part A	Describes consultancy projects and other than consultancy projects i.e activities which are specialized in nature like Export, Lease, Inspection, Turnkey projects etc.
Part B.	Describes requirements and reports for Project Management System for various business segments.

Part A elaborates the functions and processes of RITES in the area of consultancy and the additional functions and processes of RITES which are required in areas like Export, Lease, Inspection, Turnkey projects, operation and managements, training etc.

Chapter 2 deals with the activities of Finance and Accounts division. In addition to accounting, areas like vendor management, project accounting, audit trail, regulatory compliance, treasury management, risk management, planning and financial reporting etc are aimed to be achieved with ERP. **System of accounting, compilation and reporting is envisaged for more than one method/standard since RITES is in the process of transition to conversion to IFRS.**

Chapter 3 deals with activities related to Human Resource including corporate services. Aspects like recruitment, promotions, employee grievances, talent management, administrative areas and corporate services like legal, vigilance, Library and company secretarial functions etc are to be covered with ERP.

Chapter 1
Project Management System

1.1 RITES Business Areas

RITES has established itself as a multi-disciplinary organisation functioning effectively as consultants, engineers and project mangers across the globe in the entire spectrum of the infrastructure sector. RITES is pioneer for providing services in the fields of transport, infrastructure, construction activities, export and leasing of railway equipment and running railway systems on concession. The company also undertakes construction activities on turnkey basis. It has executed projects both in the domestic and international market with operational experience in over 60 countries in Africa, Middle East, South Asia, South East Asia, Central Asia and Latin America. RITES has seven Regional Project Offices (RPO) operating at Mumbai, Kolkata, Lucknow, Secunderabad, Nagpur, Tenughat and Bhubaneswar and five regional inspection offices at **New Delhi, Chennai, Mumbai, Bhilai and Kolkata**.

RITES has its business operations in the following area:

- Consultancy
- Export
- Lease
- Inspection
- Operation and Maintenance
- Project Management.
- Privatization and Concession
- Training and capacity building
- Procurement services –Material System Management
- Engineering Procurement Contract - Turnkey

Above mentioned business areas cover a diverse umbrella of services:

- Pre-Project planning involving project identification, feasibility studies and project appraisal
- Project support activities comprising surveys, environmental and social impact assessment, geo-technical and other investigations.
- Design and Detailed Engineering
- System Engineering
- Project preparation activities of tender documentation, bid evaluation, construction management.
- Project management covering contract administration, field engineering, construction supervision, procurement services, product certification etc.
- Design and development of rolling stock.
- Operation and management of railway systems including railway electrification.
- Commissioning, operation, maintenance and rehabilitation of railway systems.
- Modernisation and up gradation of workshops
- Export of rolling stock and spares of railway equipments
- Technical support and management support services

- Quality assurance management, third party inspection and technical audit.
- Multimodal Transport studies
- Signaling and Telecommunication
- Materials management including material procurement services.
- Conduct structured training and development programs for personnel of all categories and disciplines.
- Supply, leasing, maintenance, rehabilitation, commissioning of locomotives and rolling stock
- Financial, business plan, advisory services (P&C).
- Financial Management
- Design, development and implementation of management information system
- Economic and financial evaluation
- Other Support areas are - Architecture, survey, finance & accounts, environmental engineering, hydrography, structural engineering, geo-technology, photogrammetry, Industrial engineering, property development and town planning.

These diverse services cover various sectors which can be classified under

- Railways
- Roads and Highways
- Urban Transport
- Airports
- Ports & Water Resources
- Bridges & Tunnels
- Ropeways
- Industrial Engineering
- Urban Infrastructure and Urban Engineering
- Information Technology
- Export packages and Services
- Privatisation and Concessions

The various business segments of RITES undertake assignments/projects which generally follow the project cycle stated below.

- **Pre Project Activities.**
- **Project Definition, Planning and Budgeting.**
- **Project Control and Execution.**
- **Project Completion and Closure.**
- **Post Project Completion-Maintenance.**

The different stages need to consider the Technical, Financial, Accounting, Costing, Legal and Administration aspects during the project management. The following part of the chapter elaborates the diverse activities undertaken by various business segments of RITES.

Section I
Part A

1.1.1 Rail Infrastructure Division

The Rail Infrastructure division provides service and consultancy in Civil Engineering Design, Geotechnology, Track and Survey, Signal and Telecommunication and other services related to infrastructure development. In order to manage and cater various clients and projects across the county RITES has seven additional SBU's at Regional Project Offices (RPO) at Mumbai, Kolkata, Lucknow, Secunderabad, Nagpur, Tenughat and Bhubaneswar.

Civil Engineering Design

RITES provides services from concept to commissioning in the field of civil engineering design which include services like design of new rail, road bridges, rail cum road bridges and rehabilitation of existing rail, road and rail cum road bridges across major rivers and gorges, rail over bridges, rail under bridges including viaduct and rail & road tunnels.

The design activities undertaken are; Siting of location including remote sensing study and land use, topography survey, hydraulic design parameters, hydraulic model studies, geological / geotechnical investigations , preliminary / detailed structural design and proof checking. As part of the project execution proof checking is outsourced to recognized expert agencies, associate foreign experts for strengthening of design activities if required and enter into consortium/ JV.

Geotechnology

RITES provides technical services, internally and externally, to carry out extensive geo-technological investigations as part of pre-feasibility, DPR studies and also manages and supervises projects involving geotechnical work during pre-construction and construction stages of investigations.

It renders geo-technology services for rail/road projects; thermal, gas and hydro-electric power projects; tunnels, bridges, cuttings, embankments and other structure; ports & harbors; canals; dams; transmission lines; urban transport; oil exploration studies; oil & gas pipelines and underground storage sites, mobilization and demobilization of machinery and other resources and erection of drilling equipment for works.

Track and Survey

RITES conduct surveys for Railways, Highways, Airports, Ports & Harbors, Pipelines, Transmission Lines and Ropeways.

Its services comprises of Topographic surveys with / without satellite imageries, Reconnaissance survey for route selection, alternative alignments, abstract cost estimates and feasibility report, location survey using EDMs, total stations, computerized data processing, mapping, staking of alignment on ground. It also Undertake Deposit Work

Signal and Telecommunication

RITES provides appropriate and cost effective solutions to wide ranging signaling and telecommunication requirements of user agencies in Railway and non-railway sectors.

The nature of services includes Field survey and collection of Data, Feasibility studies (Radio System, Coal Transport System), Telecom System planning and design, Installation and supervision of Radio/Cabled Telecom System, Signaling System. It also provides In-house

services for maintenance of RITES Telephone Exchange, Conferencing System, Access Control and Public Address System.

1.1.2 Transport Planning and Economics Division

RITES carries out studies for integrated transportation systems, inter modal planning and traffic engineering analysis for all modes of transportation extending to urban and regional transportation system covering infrastructure planning, as well as organizational restructuring to improve transportation services.

The nature of services include comprehensive and integrated rail transport consultancy involving: traffic analysis, forecasting and modal split determination, Site selection, transport solutions for industrial units, integrating transportation and materials handling systems.

1.1.3 Building and Airport Division

Airport Engineering

RITES offers specialized consultancy services in the area of planning, design and construction management of airports. RITES is registered with the Technical Assistance Bureau of International Civil Aviation Organization (ICAO) as a potential supplier of consultancy services in the airport sector.

The nature of services include Master planning, Site Selection & obstruction surveys, Air traffic surveys, demand assessment and forecasting, Design and construction management of airport pavements, control tower & workshop buildings, Design and construction management of passenger & cargo terminal complexes including HVAC systems, ATC systems design, communication and navigational aids, visual ground aids, Baggage conveyor systems & airport equipments, Crash fire rescue systems, etc.

Urban Engineering

RITES offers consultancy services for preparation of special urban area plans for satellite towns, industrial parks, educational and commercial centers, port towns, beach resorts, tourist and pilgrimage centres.

Other services include studies to assess potential in tourism, education, industries, identification of measures for rejuvenation of economy, preparation of urban growth and development studies, preparation of master plan/structural plan/land use/zonal/ development plan, Sector studies, design and development of new townships, industrial parks etc, policy studies for poverty alleviation and slum up gradation.

RITES also develops technologies and provides engineering services related to water supply, sewage treatment, industrial effluent treatment and disposal, environmental and social impact assessment to development project. RITES also has laboratory facilities for monitoring of air, water, soil and noise parameters. The nature of services includes Water supply system and environmental sanitation industrial waste water collection, treatment and disposal, Ecological studies (fisheries, forestry and wildlife), Solid waste management, Air and noise pollution studies.

Construction Project Management

RITES renders Consultancy and Project Management Services for Institutional Buildings/Campus, Schools, Infrastructural Projects, Residential Buildings/Colonies, Hospitals, Office Buildings, Inland Container Depots etc. RITES also carries out Third Party Inspection, Technical Audit and Quality Surveillance related to project.

Special functions of this division are:

1. Conceptual and Architectural planning.

2. Survey and design studies.
3. Cost estimation and financial evaluation of the project.
4. Construction Supervision, Quality Control as per technological specifications and commercial conditions of contract
5. Preparation of cash flow statement.
6. Procurement of materials required for construction and planning and inventory control for critical items/materials.
7. Drawing/taking samples of various materials and testing the same to ensure quality.
8. **BOQ Preparation**

   BOQ covers the estimated cost and quantity of the item wise list of the tasks.

   - Separate schedule for electrical and civil works are enclosed.
   - Either an empty BOQ or the total estimated costs of items are sent to the parties who submit their EOI. The parties submit their bid by quoting the item wise rate in the empty BOQ or the total estimated cost of work (% of the estimated cost as per RITES rate).
   - Based on the tender evaluation the rates are finally agreed upon with the selected party.

9. **Measurement and certification of bills etc**
   - Preparation of Measurement Book (voluminous) by Site Engineer along with the contractor.
   - Generation of abstract MB.
   - Bills submission by Contractor to Site In-charge accompanied by voluminous MB (detailed) and abstract MB.
   - Verification of the bills by Site In-charge and submission of detailed MB, abstract MB along with the bill to concerned department in Head Office for processing of bill.
   - Verification and corrections of MB by project in charge and subsequently forwarded to accounts for verification post approval by competent authority.
   - Verification and cross checking of the bills by accounts personnel with the detailed MB and abstract MB (specially the quantities).
   - Rectifications and corrections made in the bill and sent to the department for approval.
   - Return of corrected MB and abstract MB to site in charge.
   - Release of payment after approval from competent authority.
   - Based on the work done as per the bill raised the payment can be full or partial.
   - Balance is released after satisfactory completion of work.
10. Control of schedule and quality.
11. Testing and inspection of the incoming material/ supplies and release of inspection certificates.
12. Inventory Management.
13. Training warranties of operating personnel in charge of specific operations if any.
14. On completion of project, get the completion drawings from contractor, prepare completions report and hand over the premises in fit/functional condition to the client.

Deposit Works contract

Deposit Works are executed by RITES Ltd for and on behalf of the client, who makes available required funds to meet the Works Contract Value. RITES fees and other related expenses come under the category of deposit works. Before taking up any Deposit Work, an agreement has to be executed between RITES Ltd and the client indicating clearly the Scope of Work, the financial arrangements and the items on which RITES should take client's prior approval.

Special functions of this division are:

1. **Financial/Commercial issues**
   - Separate bank account for all transactions of the project.
   - Advance for carrying out work.
   - Fee on the basis of % of cost of the project.
   - Recognizing only the fee charged by Rites for executing the project in Rites books of accounts as income.
   - Earnest money, deposit forfeiture, interest earned on short term deposits if any and miscellaneous revenue receipts are credited to client.
2. Preparation of BOQ, billing, engagement of Contractors will be similar to Construction Project Management Process mentioned above**.**
3. Statutory requirement shall be the responsibility of contractor.
4. Handover of accounts to the client after completion of work.

Electrical Engineering

RITES renders consultancy and project management services for the entire spectrum of electrical engineering covering sub-stations, transmission lines, distribution network, electrification, heating, Ventilation and Air-conditioning, Illumination systems, Fire detection and alarm management, Building security and surveillance systems, Building management system (BMS), Energy efficient buildings, Green building certification, Rural electrification etc.

The services include system planning, forecasting and designing, technology selection, and underground cabling network using satellite imageries, GPS and total station, Quantity estimation & cost estimation.

Architecture and Planning

RITES offers designs for institutional/office complexes, group housing, educational campuses, transport terminals, hospitals, buildings for the physically handicapped, workshops, industrial buildings, recreation centres, convention centre, etc.

The nature of services include Architecture Program and space planning, pre-design studies and master plan, architectural design, Structural, electrical and plumbing design, Interior design, HVAC, fire fighting cum detection services and Landscaping.

1.1.4 Technical Services Division

Operation and Maintenance

RITES Ltd provides services for operation and maintenance of diesel locomotives, wagons, Railway track; Rehabilitation of railway assets etc for domestic and foreign clients. These contracts involve subletting of the work of operation and maintenance of railway assets. The natures of services include Operation, maintenance and management of Inplant Railway Systems, Train Operation in Yards, Major schedule of Diesel Locomotives and Wagons, Modification of Locomotives and Wagons and Leasing of Locomotives / Wagons.

Special functions of this division are:

1. Payment of bills on monthly basis**.**
2. Sub-tendering/Outsourcing of work for engagement of labor etc.
3. Labor law requirements are passed on agency.
4. Periodic Renew of statutory licenses and other statutory issues related to manpower.
5. Purchase of material for maintenance.

Ropeways and Industrial Engineering

RITES offers multi-disciplinary expertise in the field of Ropeways for selection of appropriate designs and systems of ropeways suited for various terrains, traffic levels, etc. It offers an optimal choice from the monocable / bicable systems conforming to gondola, jigback and pulsed gondola system, chairlifts, skilifts, funicular railway and other cable operated systems for transport of men and materials.

Industrial Engineering unit undertakes turnkey works of construction, supply, installation and commissioning of machinery and plant for up gradation/modernization of railway workshops and production units. The group also undertakes implementation and review of group incentive schemes in railway workshop, production units and in Public Sector Undertaking

Rolling Stock Design

RITES provides services to Indian & foreign clients for design & development of rolling stock using advanced computer simulation techniques.

The nature of services includes Design, modification of rolling stock, Design and transportation consultancy for over-sized consignments, Simulation and optimization of suspension designs, Finite element modeling & analysis, Solid modeling of components, Virtual proto-typing of rolling stock design and Railway vehicle crash simulations.

Material System Management (MSM)

MSM Division offers Procurement and Logistics Management consultancy services covering all phases of procurement cycle. RITES Ltd acts as a procurement agent in India and abroad for the projects funded by bilateral and multilateral funding (World Bank, ADB etc.) agencies as well as those funded by local Government. It requires in-depth knowledge of procurement policies and procedures of Government of India, railways, DGS&D as well as those of bilateral/multilateral funding agencies for procurement of goods, works and services, expertise in field of materials management like planning, procurement, warehousing, inventory control and supply chain management.

Special functions of this division are:

1. Product and technology survey.
2. Lead-time analysis and vendor evaluation.
3. Decide method of procurement like ICB, NCB, NS etc as per contract value limitations prescribed by IFO and or/ as indicated in credit/loan agreement between IFO and borrower (RITES client) or as per procedure followed by the client's organisation.
4. Submission of procurement plans to client and IFO for approval.
5. Preparation of bid document as per clients/funding organizations guidelines.
6. Bid opening, bid evaluation, bidding documents to be reviewed and approved by client.
7. Obtaining IFO/GOI 'No objection' for technical valuation report
8. Procurement schedule based on the client requirements and/or availability of funds.
9. Import clearance and inland transportation

10. Supervision of installation and commissioning of equipment
11. Design of warehouse and optimizing warehouse procedures – space utilization, equipment, preservation and security.
12. Reimbursement from funding agencies.
13. Inventory Management and Scrap Disposal.

1.1.5 Transport Infrastructure Division

Highway Engineering

RITES provides comprehensive road transport consultancy services covering all aspects of conceptual and detailed design, supervision, operation and maintenance of expressway, highways, feeder/rural roads, bridges/viaducts and tunnels, maintenance planning/ management of road networks, strategic planning for improvement/upgrading of road system.

The nature of services includes expressway studies, transportation & traffic studies, tunneling projects. These services give advisory/technical assistance services, pre-feasibility and strategic option and techno-economic feasibility studies, network improvement studies, detailed design & project preparation, proof checking & review of design , procurement of works, pre-qualification and selection of contracts, construction supervision/project management, maintenance planning & management, Privatization, transportation & traffic studies etc.

1.1.6 Urban Infrastructure Division

Urban Transport

RITES renders consultancy services for urban transport projects, mass transit systems right from traffic assessment to construction supervision. Regional transport studies are undertaken for optimal use of available infrastructure and phased augmentation of facilities for medium and long term.

The nature of services include maintenance of urban transport infrastructure, transport demand modeling, integrated multi-modal mass rapid transport planning, design and planning of rail based mass transit systems, planning and design of grade separated roads (flyovers, elevated roads, clovers etc.), transport planning at city, regional and national levels, traffic engineering and management, planning & design of bus terminals, innovative schemes for financing urban transport projects etc.

Ports & Water Resources

RITES provides total consultancy services from concept to commissioning for ports & terminals including hydrographic surveys, field investigations, project reports, detailed engineering and project management for water resources/ Inland water transport (IWT) projects.

The nature of services include harbors, dredging and reclamation, navigational systems, breakwaters, berthing structures, dry docks, material handling systems, cargo storage systems, advisory services for privatization water resources / IWT sector, waterway development, river engineering, barrage and canal structures, river terminals, reservoir sedimentation, coastal zone mapping surveys.

Export and Lease

Expotech conceives export as total package for supply of locomotives, railway rolling stock, spares & subassemblies and allied services like sizing, selection, supply, commissioning, rehabilitation and leasing of Railway Rolling Stock

The nature of services include consultancy in operation and maintenance of Railway Rolling Stock, Training, Transfer of technology in maintenance of Railway Rolling Stock, After-Sales-Service for Railway Rolling Stock Expotech division operates in various countries like Tanzania, Mozambique, Vietnam, Sri Lanka etc.

Special functions of this division are:

1. Establishment of L/C.
2. Purchase of railway rolling stock, machinery and plant and spares etc
3. Import of items for fitment on rolling stock being manufactured for export
4. Movement of material to workshop.
5. Movement of Rolling Stock to port of shipment & arranging ODC clearances etc
6. Logistics for Transportation of execution of import/export
7. Establish the import/export benefits & filing of claims to statutory authorities.
8. Checking Locomotive and other rolling stock performance
9. Dispatch of consignment & taking action on damage boxes received by client.
10. Warehousing and inventory management.
11. Plan and arrange setting up adequate setup in client countries for after sales services.

Lease Contracts

Lease can be of two types:

1. **Dry Lease**-Type of leasing in which the lessee arranges and pays for the fuel, maintenance etc.
2. **Wet Lease-**The wet lease is an arrangement whereby the lessor provides some maintenance and fuel etc. The lessor retains some responsibility for supplying and operating the locos.

Special functions of this division are:

1. Check if lease contract is with or without spare parts, period of lease contract with respect to the life of the asset.
2. No Letter of Credit (LC) payment term in a Lease contract.
3. Preparation of input estimate taking care of the residual value of the locos depending whether they will be useful later for the company for leasing them elsewhere after expiry of lease period because the cost incurred in bringing the rolling stock back to our country will be huge and of no use.
4. Customization of rolling stock locos etc. according to the demand of foreign clients.
5. Purchase of locos from the Indian Railways for leasing them.
6. Maintain a workshop in client country for a certain number of years in case of Wet lease.

1.1.7 Privatization and Concession

RITES Ltd provides In-house advice to the company management while participating as equity partner or joint venture member to secure infrastructure projects in areas, namely Technical Assistance (Advisory support) to company management, Carrying out works or services contracts including rehabilitation of infrastructure, Leasing / Selling of Locos and Rolling Stock, Rehabilitation and maintenance of locomotives and rolling stock, Providing support in pre-takeover activities including arranging of finance, other technical and management support during operation or rehabilitation stage and monitoring performance of concession companies, Providing advisory services in infrastructure projects including bid process management, project structuring studies for PPP, services of independent engineer.

1.1.8 Quality System (QS) {Inspection/Quality Assurance (QA)}

QA division of RITES Ltd provides quality services to clients for independent inspection of materials and equipment in India and abroad. Subletting of the contract to other agency is not permitted in inspection.

QS division of RITES Ltd is providing consultancy on various management system (ISO certificates etc) to various organization In addition it also undertakes training programs and conducts studies for the client organization. The nature of services include third Party Inspection, Vendor capability/capacity assessment, Laboratory Testing, Development of Quality Assurance plans, Consultancy for certification in ISO etc. and training for management systems.

In order to manage and cater various clients and projects across the county RITES has five additional SBU's at Regional inspection Offices at New Delhi, Chennai, Mumbai, Bhilai and Kolkata. Each of the regional office has its network of sub-regional offices and inspecting engineers. The inspection services are backed by modern in-house laboratory facilities providing vital technical support.

Special functions of this division are:

1. Arrangement of purchase documents, drawings, and quality assurance of supplier.
2. Attending inspection call.
3. Insurance for the team
4. Re-inspection, if required, either billable or not
5. Preparation of inspection report & other document
6. Raising of invoice & adjustment of advance received

1.1.9 Training Division

RITES Ltd is internationally recognized as a provider and facilitator of comprehensive and structured training to personnel of all categories and disciplines. It organizes structured training and development programs for its clients in India and abroad. Participants are invited from foreign countries for trainings organized in India and Indian participants are invited to attend trainings both in India and abroad. Sometimes trainings are also a part of existing ongoing project of RITES Ltd.

The nature of services includes organizational structuring and manpower planning, curriculum development, setting up of training institutes management of training institutes. In-house training has been covered under HR functions later.

Special functions of this division are:

1. Development of training infrastructure, selection of training institutes and Curriculum development.
2. Check whether training is funded through International agencies.
3. Logistics support to training programs.
4. Allocation of Training of trainers/resource persons.
5. Training fee is charged participant wise and includes accommodation etc.
6. Issue of Training certificate to the participants.

1.1.10 Information Technology

RITES provides consultancy services in the field of Information Technology from concept to commissioning covering specialized areas like Simulation, Engineering, Operation Research based location / allocation projects, besides Commercial applications.

The natures of services include Preparation of computerization plan, System study and analysis of information, Design, Development and implementation of application software, application software maintenance, Selection of computer systems, Consultancy in site preparation, Installation and testing of hardware, Hardware sizing and Network Designing, ISO 9000 quality assurance for software development. In-house training has been covered under HR functions in the section ahead.

Special functions of this division are:

1. Requirement analysis
   - Determination and review of requirements (Functional and Performance)
   - Statutory and regulatory requirements
   - SRS preparation and submission
2. System design
   - Design of inputs/outputs
   - System Design Manual
3. Review and verification of the design
4. System development
   - Development of inputs/outputs
   - Development of prototype
   - Review, verification, validation
5. Testing and integration
6. Installation/implementation,
7. User training
8. Documentation – User Manual, System Manual
9. Billing and Warranty maintenance

1.1.11 Financial Management

RITES offers wide ranging financial consultancy services which include

1. Financial appraisal
2. Designing computer oriented structure of accounts and financial management information systems
3. Organizational studies for financial management system
4. Development of manuals for accounting and financial management system
5. Working capital management
6. Design and development of costing system
7. Development of internal audit systems and their implementation
8. Monitoring of construction management contracts
9. Asset management & its valuation
10. Designing and implementation of commercial & Govt. accounting
11. Structuring of statutory duties, levies and tariffs

1.1.12 Turnkey Project

RITES Ltd in turnkey projects manages the project from the concept to commissioning of Production and Maintenance, Centers including modernization, productivity, Improvement, material handling etc. Its scope of work includes Construction and supply, installation and commission of machinery and plant for up gradation/ modernization of Railway Workshops and Production units, Project reports, detailed estimates, planning, machinery and plant, material handling facilities for setting up of Railway Workshops, Tendering Services and Finalization of Contracts, Engineering and topographic survey of pipeline, designing of safety aspects, corrosion protection technique, Designing of loading/unloading gantry, Railway siding facility

Special functions of this division are:

1. RITES shall act as a Contractor for the work awarded by the client.
2. Preparation of BOQ, billing, engagement of contractors will be similar to Construction Project Management Process mentioned above**.**
3. RITES need to ensure statutory compliance and other contractual obligation as that of contractor.

The next section gives a brief about the process followed during Project execution describing the activities undertaken during the five stages of project management and inspection management.

1.2 Process in RITES Projects

(a) Process of Project Management

This section lists the activities in consultancy and other specialized business segments like export services, inspection management, material management, construction project management etc. The projects cycle undergoes the five stages of Project Management. On the basis of the functions and activities of different departments the brief process of Project Management System is defined below

Process : Pre Project Activities

- **Business Opportunity**
  - Scanning of Business Opportunity- Newspaper, business letters, internet scans, and agent's concerned ministries.
  - Tracking Business opportunities from already existing/ new clients in existing & new area of operations.
  - Proactive marketing
  - Contact management- contact to lead, contact to opportunity, Lead to opportunity, opportunity for Project management.
- **Preparation for assignment**
  - Business Intelligence - Study of client's history.
  - Study and comparative analysis of other similar projects.
  - Study-(Technical / Financial/Legal/commercial/ operational aspect).
  - Get the availability of logistics, manpower and infrastructure.
  - Get approval of Competent Authority as per financial delegation of power.
- **Financial Aspect**
  - Resource Budgeting and cost estimation for offer.
  - RITES latest man month rates, overheads etc. shall be as per issued direction & guidelines issued by Finance & Accounts.
  - Market scanning and assessment of competitor shall be given due consideration for getting works awarded.
  - Vetting of cost estimation
  - Earnest Money Deposits to be submitted along with Bid
- **Bid preparation, submission and follow up**
  - Submission of Expression of interest
  - Determination of requirement
  - Analysis of work/tender/contract.
  - Resource availability & its planning.

- Techno commercial study of the offer and detect inconsistencies in tender documents.
- Plan bid preparation based on Type of work, client, geographical, technical preparedness.
- Assure that Special Conditions/Specifications for qualification are fulfilled -which are discussed in the pre-qualifying criteria.
- Attach certificate for similar kind of work done in the past.
- Review other contract clauses such as :-
  - Dispute resolution clause.
  - Conditional clause & restrictive clause.
  - Define Support required from client.
  - Compliance to labor rules be principal employer.
  - Basis of charging – Man month, Activity based , lump sump, phases).
  - Duration /validity of the contract

- Bid submission and Payment of EMD.
- Track Bid process and evaluation.
- Negotiation with client and Finalization of terms and conditions.
- Notification/ award of contract and signing of contract with client.

Process :Project Definition , Planning and Budgeting

- **Project management**
  - Review of contract on award for technical and commercial viability.
  - Definition of project.
  - Allocation of Project Code
  - Defining the parties involved.
  - Type of client (Govt/PSU/Private/Foreign)
  - Define scope of work, project description, start date and period.
  - Define project work breakdown structure, project scheduling and design.
  - Define project methodology.
  - Milestone definition
  - Define the expected results.
- **Administrative**
  - Manpower planning
  - Allocate resource (manpower & logistics etc).
  - Define the responsibilities and roles of the resources.
  - Define deliverables including various stages/phase.
  - Define works to be sub contracted/ consultants to be engaged
  - Define job closure norms.
  - Allocate additional resources for maintenance.
- **Technical Aspect**
  - Functional and performance requirement.

- Identification and arrangement of services required from other Group / Divisions of RITES Ltd. or organizations such as Indian Railways and its units, RDSO etc as per requirement.
- Design Development, Documentation and Planning- (Input, Output, Review, Verification Validation & Changes).
- Preparation of quality assurance plan
- Define and check technical parameters
- Initial Study and submission of design or project report.
- Planning hardware and software requirement.

- **Financial Aspect**
  - Fund management and accounting
  - Cash Flow Planning of input estimate
  - Defining payment terms
  - Make provision for inflation.
  - Mobilization advance/fee
  - Invoice as per Terms of Reference including BG are submitted to Client
  - Source of Fund (MEA, World Bank, ADB, Others)
  - Allocation of fund and overheads.
  - Estimate the approximate expenditure under various sub heads for submission of bids.
  - Define currency for receipts and payments.
  - Separate accounts for client and for internal purpose in case of deposit works.
  - Opening separate bank account.
  - Opening joint venture account if required.
  - Reimbursable expenses.
  - Liquidity damages

Process : Project Control and Execution

- **Technical Aspect**
  - Mobilize resources, Deploy resource and task delegation
  - Procurement / Sub contracting for Project - Selection of consultants and tendering (Process of tendering is specified later in the subsection 1.3 of this Part).
  - Client meeting and liaison with client.
  - Maintain collaboration with other JV partners if any.
  - Establishment of site office if required
  - Commencement and execution of task assigned.
  - Collection of information, review and analysis of data.
  - Field Study/Data Collection/Monitoring Report
  - Submission of Detailed Project Report for review and client approval.
  - Project Monitoring - Milestone comparison, Inspection of officials to review progress of work.
  - Control and variance analysis

- **Financial Aspect**
  - Budget Monitoring and Resource accounting
  - Raising of invoices on due dates,
  - Receipt of payments from client & processing payments of sub contractors /supplier.
  - Keep account of expense which are reimbursable from client.
  - Accounting of all vouchers
  - Taxation
  - Periodical submission of account (specially in deposit works)
  - Generating MIS
  - Compare the actual project costs with the estimated cost as worked out in the input estimate.
  - Control of project costs (revision of project cost and estimation).
  - Evaluation of profitability of the project.
  - Audit of Project accounts
- **Commercial Aspect**
  - Compliance of all statutory requirements
  - Statutory Taxes
  - Patents and copyrights
  - Insurance
  - Deliverables
- **Others**
  - Generate mid project performance report
  - Check whether the project is overdue for completion.
  - Development of data bank for use in framing estimates and offers subsequently.
  - Complaints if any

Process : Project Completion and Closure

- **Financial Aspect**
  - Cash flow analysis.
  - Budget analysis.
  - Liquidity damage if any
  - Final Accounting closure of project
  - Final recovery of Earnest money, security deposit and bank guarantee
- **Final project, client account closure**
  - Documentation and data control of specific documents / data / drawings of a project
  - Prepare a summary report highlighting the major problems, their remedial actions.
  - Determine level of achievement of planned targets
  - Completion certificate from client,
  - Assess Customer Satisfaction from client feedback
  - In case of construction supervision, handing over of the completed infrastructure will amount to act of completion

- In case of Detailed Project Report, Feasibility Studies, Surveys etc, submission of the final report or acceptance by the client will be treated as completion.
- In certain cases, final approval of regulatory authority is required
- Generation of closure documents.
- Generate final project performance and its audit.
- Management Review of financial performance, offers sent, contract secured, pending contracts, rolling stock performance, resource management and training, improvement of present system

Process : Post Project Completion-Maintenance

- **Administrative aspect**
  - Allocate the manpower for maintenance.
- **Technical Aspect**
  - Action plan for the remedial action to be taken in case of follow up activities during maintenance.
  - Removal of defect, if any, during defect liability period
- **Financial Aspect**
  - Performance guarantee.
  - Define budget and cost estimates.
  - Final closure of project
- **Legal Aspect**
  - Define the period and terms and condition.

(b) Process of Quality Assurance/Inspection Management

The process and activities undertaken by Inspection Divisions are job specific rather than project specific. RITES is involved in quality inspections of third party equipments and material that are procured by Indian Railways, State Govt. Organizations, PSU's and Private Organizations. A formal contract agreement is set up between RITES and the organization desiring an inspection.

The general work flow is as follows:

1. A Vendor/Manufacturer that desires a quality inspection of items places a call on RITES. A copy of Purchase Order (PO) providing following information must be sent to respective inspection office if this is a first call.
   - PO No. & PO Date / Offer letter No. & Date
   - Vendor On whom order has been placed
   - Name of Purchaser
   - Consignee & Bill Paying Officer
   - Item Description, Unit Price, Quantity, relevant taxes, excise, discounts etc (if any), Unit of Measurement, Delivery Period, Consignee.
2. The purchase order can have one consignee or multiple consignees. Similarly each consignee can have separate bill paying officer or there can be a common bill paying officer against a set of consignees.

3. For each item in PO the consignee & corresponding Bill paying officer must be available. For subsequent calls on same PO, Case no. allocated by RITES must be mentioned by the Vendor/Manufacturer.
4. After receiving a call it is validated and allotted a unique running serial no. for that day.
5. The concerned authority of inspection division marks the call to an Inspection Engineer.
6. The Inspection Engineer submits a certificate for the inspection work carried out by him/her. Each inspection certificate is uniquely numbered as per RITES patron.
7. In addition, check sheets of tests carried out by inspection engineer are also attached with the certificate and submitted in the respective Inspection Division.
8. Based on the information in Inspection Certificate, a Bill is raised to the client for the items inspected.
9. If the call is cancelled by the Vendor/Manufacturer before it is attended, then no fee is charged by RITES.
10. If the call is cancelled by Inspection Engineer due to non availability of items or due to inadequate testing environment at Vendor/Manufacturer site, then cancellation charges are levied on the client.
11. In the first week of every month a customer ledger is printed in the specified format for each client listing out all bills raised for that client in the previous month.
12. For private party inspections fee is charged in advance. An indication to this fact is made in the call when it is received in the Inspection office.
13. If the client makes a payment by single instrument for inspections carried out by more than one Inspection Division, then Inspection Division who receives the payment transfers the share of other units through Inter Unit advice/transfers & receipts.

1.3 Tendering for Procurement – services, material, equipment and works

RITES at times subcontracts work to other parties. This requires the work to be tendered to the third party. The brief process of tendering is defined below:-

1. **Pre Tendering**
   - Getting client approval for outsourcing if required.
   - Finalization of the Pre-qualification of the bidders (work experience, turnover, liquidity, ownership, purchase preference etc)
   - Preparation of document for tendering- Check provision for cost in the budget of the project, decide mode of tendering (Single/ Limited/ Open Tender), period of completion, no of suppliers to be engaged, enclosures and EMD required, Formation of tender committee.
   - Specify tender conditions like scope of work, estimated cost, obligation and responsibilities of concerned parties, payment terms and schedule, penalty clause, liquidated damages, etc.
   - Get concurrence from finance and approval as per schedule of Power from competent authority for vetting of proposal and NIT and tender documents before publishing.
2. **Publishing of tender**
   - Name of newspaper/ RITES Ltd website and dates when NIT is to be published.
   - Sale of Tender document
3. **Opening of tender**
   - Date and time when tender is to be opened.

- Date up to which tender document is valid
- Open tenders received on specified date.

4. **Examination of tender**
   - Check the validity and correctness of the documents and enclosures (eg EMD, income tax clearance etc).
   - Submit the EMD to accounts for verification and deposit
   - Refund of EMD to vendors who are technically not satisfactory.
   - Evaluate the technical bid - verify work experience/ profitability, liquidity, turnover, rating, performance, history, registration, etc of the bidder.
   - Commercial Evaluation- Open the price bid of the technically competent vendor.
   - Preparation of comparative statement, briefing note, evaluation and negotiation of the rates quoted and get it vetted from finance.
5. **Award of Work**
   - Prepare justification statement and based on recommendation take approval for award of work.
   - Post award issue "Letter of Intent"/ Purchase Order to selected party
   - The party on acceptance should submit letter of acceptance and performance bank guarantee.

Part B

1.4 ERP-Requirements and reports of Project Management

Based on the above given description of functions, activities and process of various departments of RITES Ltd, requirements and reports essential for each stage of project stage are identified.

Project Stages

a) Pre Project Activities
b) Project Definition, Planning and Budgeting
c) Project Control and Execution
d) Project Completion and Closure
e) Post Project Completion-Maintenance

a) **Stage- Pre Project Activity**

Requirements- System should be able to provide the following features:

1. Scan business opportunity through study of data available for similar projects already handled by Rites/ opportunity with the existing client.
2. Technical/Financial/Legal/commercial/operational aspect of similar projects.
3. Establish project plans by combining sub projects from different projects.
4. Extract historical cost data per activity for analysis and annual budgeting process.
5. Create cross-project relationships
6. Define projects as template projects to be used for building new Project Plans

7. Prepare offer/Bid document/draft EOI.
8. Provide different templates for Costing models.
9. Define work flow, methodology, manpower costing based on man days for new projects.
10. Determine planned project duration and cost.
11. Create activities as the base unit for analysis of all information related to costs, progress, deliverables etc regarding the project.
12. Create the network diagram of the project
13. Make provision for creation, storing and view of CV's.
14. Capture details of LC (validity, expiry, last date of shipment, amount, description of materials address of beneficiary place of destination, documents to be submitted as per LC terms.).
13. Capture and store government and regulatory information requirements needed for project execution.

14 Plan pre-bid meeting and recording of minutes of the meeting and clarifications given for queries of bidders are recorded.

15 Provide access to details of earlier adopted Qualification Requirement, Scope of work, Contractor / Bidders details etc., of earlier executed Projects of similar capacity for reference purposes.

16 Provide a facility for Indexation and categorization of proposals for new projects / schemes and

17 Provision to revise pre-award schedule including splitting, stretching and crashing of activities

18 Configure approvals as per SOP (Schedule of Power)

19 Maintain a repository of details of breakup of cost estimate, of past executed Projects/packages of comparable capacity and types, for reference.

20 Capability to date and time stamp all changes in the database

21 Capability of retaining the data structure and format even after future updates

22 **Export Oriented**

- Classify type of export sale, (CIF/FOB) and type of lease (wet/dry)
- Make analysis of FOB and CIF contracts
- Availability of material in India or imported from foreign country.

Reports- System should be able to generate the following reports which will aid in preparation of **Offer Document**:

1. Generate project cost analysis report (income, direct expenditure, staff cost, travel, supplies/services, etc).
2. Expected future projects (Details of Bids submitted, Offers materialized) and manpower requirement.
3. Offer register (offer type, submission date, contract date, client name, funding, location, etc.
4. Details of Similar projects handled
5. Details of the offers submitted and projects secured/increase in fee against the ongoing projects during the month/year.

6. Details on estimated project cost, manpower requirement, material, fund requirement and overheads.
7. Details of ongoing/ completed projects / works (SBU wise/ Period wise).
8. Histogram and spreadsheet by resource code, stacked histograms by resource, role or code and Resource Graphics (Pie, Area Charts).
9. Project profiles (comprising of elements like name, type, capacity, land details, mode of funding, beneficiaries and major milestones etc) in WORD, PDF and EXCEL formats.
10. Retrieve government and regulatory information.
11. Details of offers not materialized and reasons for their failure.
12. History of the vendor, work awarded to him by an SBU or Rites as a whole.
13. Standard terms and conditions.
14. Manpower Planning - Total manpower available, assigned on project and period, on Training, expected to be deployed, due to retire.
15. Details of the project year wise, office wise, division wise etc.

b) **Stage- Project Definition, Planning and Budgeting Activity**

Requirements- System should be able to provide the following features:

1. **Contract Review**
    - Capture and prepare deviation statement (contract documents should be in line with tender documents).
    - Define scope of work, SLA, product specification, performance guarantee warranty terms, safety conditions and any other terms/ conditions/specifications and generate draft contract agreement along with terms and conditions.
    - Make provision for adding/ deleting special/general conditions of contract, amendments against the project and intimate to all concerned.
2. **Project Detail Setup**
    - Open and approve new project and assigning of project code.
    - Capture project details, should include (project name, type, description, project owner, project manager, status, source of fund, project cost center, location, beneficiaries, major milestones, technical details, financial details, etc.).
    - Define project as capital/revenue.
    - Define RITES role in project (eg Contractor, consultant, JV, consortium etc.)
    - Record third party information against the project.
    - Define project hierarchy in terms of project, sub-project, work order and tasks.
    - Define type of work, client type, location, sources of fund, deposit work, basis of charging fee, SBU, and other relevant terms of contract.
3. **Project Scheduling , Resourcing and Budgeting**
    - Perform multi-project scheduling, leveling and summarizing and enable approval of project schedule.
    - Provision to revise project plans, updating/modifying changing the baseline schedule and maintain audit trail of all the changes.
    - Develop a broad level implementation, timeline, specification, schedule, procurement timeline schedule based on the project intimation.
    - Define the activities of a project and auto-naming as per the pre defined rules.

- Define activities as milestones, relationship between activities and work breakdown schedule.
- Allow user to define and assign constraints to tasks/activities and milestones.
- Allow user to assign priorities to different tasks/projects.
- Facilitate definition of a task with the duration being automatically calculated based upon its dependency with another task.
- Assign constraints, resources, roles to activities and allocate manpower to the work.
- Support splitting, stretching and crashing of activity in the network as per requirement
- Define work timings/ tasks in terms of (days/hours/weeks/months etc)
- Provide facility of Timesheets to facilitate time booking by project personnel
- Define the requirements (materials, equipments, and specialized labor) for the project.
- Administer budget and schedules and include budget number, description, amount, status etc.
- Make and track changes in the budget after budget is approved (by budget number/date person making changes).
- Allow review of budget requests by departmental manager.
- Allow an approved budget to be assigned to multiple projects.
- Period wise fund requirement for the project.
- Escalate project cost on account of inflation and show inflated cost separately.
- Get technical and commercial approval as per schedule of power

4. Allow flexible sharing of a resource amongst multiple projects.
5. Facility to set inter-project relationship.
6. Ability to create user defined fields to store additional descriptive information.
7. Generate alert on delay in starting/completing major activities/milestones.
8. Assignment and display of tasks in all projects using common resources/infrastructure.
9. Ability to prepare standard templates for pre feasibility, feasibility, detailed engineering, DPR etc.
10. Decide method of procurement like ICB, NCB, NS etc as per contract value limitations prescribed by IFO and or/ as indicated in credit/loan agreement between IFO and borrower (RITES client) or as per procedure followed by the client's organisation.
11. Preparation of procurement plan, bid documents as per IFO.
12. Capture the particulars of statutory/regulatory clearances required.
13. Ability to send requisition to Finance for establishment of LC in case of LC payment terms.
14. **Procurement of services**
    - Maintain a list of services that can be contracted out.
    - Group together similar services and define service catalogues / service specifications.
    - Allow procurement of project services from approved and qualified sources.
    - Define a unit of measurement of the services (Hours, Kms, Volume, lump sum etc).

- Offer economic services considering the quality, delivery, reliability, and service
- Automatic /manual generation of WO / AMC.
- Provide for approvals of the service entry / hiring.
- Capture the RITES approved manpower rates payable to manpower agencies
- Automatic calculation of commission to manpower agencies.

15. **Contract Management, Sub-tender for the project/ service/ material.**
    - Link quotations/ request with WBS.
    - Receive online purchase request from different departments through the system.
    - Store Online Requisition approval
    - Scrutinize the final indents for completeness – mode of tendering, type of enquiry, no of suppliers to be engaged, whether the item is critical, repeat order
    - Define and prepare tender documents and standard contract formats as per RITES guidelines including compliance to checks and controls.
    - Facility of getting approval of the Competent Authority for issuance of enquiry, as per financial Delegation Of Power (DOP), online
    - Raise Final Indent along with bill of material/Bill of Quantity required to be procured
16. **Vendor and Service management**
    - Receive Vendor Registration Application from vendors online
    - Create category master for vendors and sub contractors- registration details, registration no, contact details, bank details, area of expertise, turnover, rate list, Bill-to-entity information: currency, mode of payment, shipment method, terms, and receipt acceptance Requirements.
    - Store and retrieve technical / financial qualifications of all suppliers and contractors and their past performance history.
    - Provide single point of access to information related to vendor and sub -bidder pertaining to work schedules and equipments warranty / guarantee.
    - List the available sub contractors and the rate list based on the items listed in the PO.
    - Screen and rate vendors/suppliers by reviewing their performance history, financial status, safety records etc. and ability to black list them, provide list of blacklisted firms.
    - Facility to upload documents (vendor registration, work certificate, solvency certificate, etc) submitted by the vendor.
    - Send letter to vendors in case their vendor rating is below minimum level prescribed.
17. Prepare NIT, RFQ, etc and send it to Public Relation Department for publishing it in national/local dailies.
18. Automatic publishing of NIT/RFQ etc it at the RITES website.
19. Take approvals for tenders, internal estimates, costing and EMD.
20. Electronic mailing of the NIT/RFQ to the vendors in case of Limited Tender Enquiry / Single Tender Enquiry
21. Obtain quotations from vendors online within the stipulated time frame
22. Send Bids receipt details to all the TEC members.

23. Stipulate Date and time of opening and submission of tender, Type of enquiry, Money Deposit (EMD) required or not.
24. Open the quotations (Tender Opening) through system
25. Record business opportunities on single tender/nomination basis
26. Send meeting notice to the concerned persons through online system
27. Support Limited Tender Enquiry System on short listed vendors.
28. Ensure whether minimum number of quotations (offers) is received on date of opening.
29. Extend due date of tender opening in case Requisite minimum offers are not received.
30. Prepare Comparative Statement (Considering all the pricing elements) for offers received in Single Part.
31. Get technical evaluation done by indenting agencies/ users online and generate evaluation report.
32. Provide a facility to open the price bids online and perform an online commercial evaluation ascertaining the conformity of offers to enquiry terms and conditions.
33. Automatically send the details of the security deposit, EMD submitted by the vendors to the Finance department.
34. Online comparison of the L-1 offer received with the estimated price and conduct price negotiation.
35. Automatic transferring of data from Comparative Statement to Purchase Order.
36. Obtain concurrence for release of PO as per financial delegation of power including concurrence from finance.
37. Generate PO/LOI. PO should include details of contractor, description of products/services, quantity of material, associated test certificates required, verification/ inspection of material, review and verification of services, date and place of delivery.
38. Store Manual entry of purchase order and automatic sequential purchase order numbering scheme
39. Store Multiple order types: single; blanket; maintenance, repair and operational parts (MRO)
40. Post award store the details of the Performance guarantee received.
41. Send, documents received from vendors to the users for approval.
42. Keep record of relations maintained, details of business opportunities in-case of sub tendering for International agencies.
43. **Export Management**
    - Identification and Assessment of Export Benefits and manage export incentive schemes
44. **Operation and Maintenance**
    - Maintain the details of RITES empanelled skilled manpower recruitment agency.
    - Maintain the details of RITES approved labour rates.

Reports -System should be able to generate the following reports on:

1. Checklist for contract review (name of work, type of work, resource requirement, adequacy, etc).
2. Project Monitoring- status, milestones achieved.

3. Project Costing Reports on fund requirement, manpower, material, expenditure and overheads
4. Details of ongoing projects / works and completed works (year-wise)
5. Extract project profiles (elements like name, type, capacity, land details, mode of funding, beneficiaries and major milestones etc) in WORD, PDF and EXCEL formats.
6. Details of the Performance Guarantee submitted and received
7. Generate statement for evaluation of bid and statement for the EMD received.
8. Provision to view guidelines of international funding agency.
9. Report on minutes of business meetings for business opportunities
10. Provision to view RFP's, old Proposals,/LOI, contract agreement/SLA
11. View and download PDS, CVS, Short CVs
12. Register of Contract to Supplier
13. List of services provided to other SBU's within RITES.
14. List of LC and their details.
15. **Vendor management**
    - Details of the vendor registration
    - Details of the new vendor registration certificate issued.
    - Details of the vendor registration renewed.
    - Details on Vendor wise rating, performance details, history details, registration validity due to expire on a given date.
    - List of approved contractors/sub- consultants (name and address, contact person and number date of approval, material supplied/ services offered, performance, reasons for de-listing if any).
    - Make payment information available to the vendors through system.
    - Details of vendors and projects already worked upon by them.
    - Generate a list of blacklisted vendors/ disputes against them.
16. **Contract Management**
    - Details of tenders issued /status in a month/year
    - Generate and send delivery letters
    - Details and list of pending purchase requisition not converted to PO.
    - Details of the purchase requisition pending for issuance of enquiry.
    - Details of the schedule due to expire
    - Details of purchase orders placed section wise, group wise and party wise between two dates
    - Details of NIT published (annually/monthly), bids received against the tender
    - Details of the PO/LOI issued (period wise/client wise/project wise/SBU wises).
    - Generation of Notification of Award (NOA).

c) **Stage- Project Control and Execution**

Requirements- System should be able to provide the following features:

1. Enter project work in place/ percent completion.
2. Analyze network or Critical Path Analysis (PERT) and pie charts for project activities.

3. Associate activity wise resources (manpower, material, etc) to the project.
4. Automatic triggering of activities after completion of a particular task.
5. Monitor the status of key/critical parameters and raise alerts in case of any deviation.
6. Store/ modify/retrieve resource allocation details.
7. Ability to revise cost estimates recording the reasons for the change.
8. Allow changes to be made in a project structure created from a template model.
9. Allow the actual complete date to be entered against milestones and calculate completion date on remaining milestones.
10. Ability to identify activities that are adding to cost overrun.
11. Display status of resources over/under allocated.
12. Able to provide entry in standard forms of RITES for project execution and generate report of completed form. (Eg. Form 1 for Environment Engg.)
13. Provision to measure status of the project, expenditure details, work completed, bill raised, revenue incurred.
14. Track key milestones and forward milestone details to relevant personnel for approval.
15. Integrate contracts management system with the projects module for work progress.
16. Provision to record the hindrance (nature of hindrance, work affected, date of hindrance, date of removal of hindrance, delay, remarks etc.) that occurs during the project execution.
17. Track all documents in the project with a facility to trace with who is the current owner of the file/document.
18. Facilitate project managers to gain insight into the project performance displaying project trends and problem areas using powerful analysis tools.
19. Track the file through online system
20. Forecast estimate at completion.
    - Retrieve information and reply to queries from the following agencies – internal audit, vigilance, etc.
21. **Project Monitoring and Controlling**
    - Monitor project costs, comparison of budget versus actual values at different levels of the project during execution
    - Record/modify/retrieve quality inspection results at different stages of the project to ensure consistent quality throughout the whole project lifecycle
    - Undertake management of documents and workflow.
    - Allow for updation of activity dates, % completion of works, resource assignment details, actual units for overhead codes, expense.
    - Manage Time sheet project members.
    - Capture daily/weekly/monthly/ annual physical progress details for monitoring.
    - Identify variations from schedules / network at activity level and generation of alerts at defined terms and exceptions.
    - Generate alerts on slippage of completing major activity / milestone.
    - Run schedulers, review time sheet, float path analysis.

- Capture day to day hindrances happening during the execution of the project in structured manner.
- Escalate the day to day unresolved issues to higher levels.
- Enable the implementation of quality control system.
- Provision for raising alert if the contractor is not responding to the level that the same is hampering the progress of the project.
- Enable the termination of the contract in exceptional circumstances and record the reasons for the same.
- Facilitate the project review meeting and record the agenda and circulate the minutes of meeting.
- Workforce Management-
- Demand, visibility of resources across the organization, skill availability, capacity building.
- Time recording of employees via detailed work sheet.

22. **Project Change Management**

- Track various potential change issues as they occur.
- Monitor various change estimates at various user-defined levels i.e pending, approved etc.
- Link changes to WBS.
- Document the variance in detail and send triggers.
- Time recording of employees via detailed work sheet.

23. **Document Management**

- Support attachment of reports, drawings, documents, specifications, instructions etc to each project activity in formats like WORD, EXCEL, PDF, CAD, Visio etc.
- Keep a repository of various documents related to project i.e. Design documents, DPR, study report in DMS.
- Maintain a versioning of documents.
- Sharing of documents via the internet to authorized users.

24. **Contract Management**

- Maintain contractual delivery dates, and progress, billing and milestone planning.
- Receive Performa invoice from clients and transfer to finance.

25. **Project Billing**

- Automatic milestone/ stage based generation of invoice and recording of payment received against it.
- Capture details of the bills received from contractors and payment made against them.
- Prompt alert for delay in payments.
- Send information to Finance regarding recovery from a defaulting supplier

26. **Vendor and Service management**

- Define an invoicing/billing plan, as agreed with the vendor/subcontractor /suppliers, involving, for example, milestone based billing or progress billing.

- Support inspection of vendor deliverables for compliance to quality plans and recording the results of the inspection and issue of compliance certificate thereof
- Record details of payment terms, validity period and applicable Indian taxes, charge and discounts, insurance costs.
- Capture and scrutinize the complaints, performance of each sub consultant and transmit the same to vendors through system
- Ensure that vendor payment is processed only after the goods are received.

27. **Project cash management**

- Support manual and automatic cash planning based on project resource requirement.
- Maintain actual cash in/ cash out – derived from payments terms and relevant posting.
- Cash data – linked to revenue structures.
- All cash reports should be linked with cross project reporting.

28. **Project Material Procurement**

- Schedule Project inventory demand – for rolling stock and construction management.
- Float NIT for material requirement, bid (technical and financial) evaluation and generate Purchase requisition.
- Conduct acceptance test for product purchased before shipping it to the client.
- Modify the description of an existing item due to revision in design, drawing, etc.
- Maintain a list of material received from client and to be returned to client.
- Issue Project Demanded Materials from inventory and its accounting against the project.
- Support emergency procurement of inventory at site.
- Register goods receipt or service completion and generate checklist for inspection, work completion and quality control.
- Register Inspection calls, schedule.
- Raise Final Indent along with bill of material to be procured
- Store the entry/usage/exit of consumable materials directly brought in/taken out by the contractor for a project.
- Capture the details of the materials lost/ damaged during execution of project.
- Automatic notification to the contractor in case of defects, quality shortage.
- Issues Goods Receipt certificate.
- Prompt alert in case delivery has not been made as per PO schedule and send an online reminder to the defaulting vendor.
- Send delivery follow up letters to the vendors online for advancing / expediting / deferring deliveries.
- Receive Performa Invoice from the vendors online and transfer the same to Finance for effecting payment.
- Provide information to the vendors regarding the payment information.

29. **Material Supply Management**

- Provide updated item wise and category wise registered vendor list

- Automatic referring to Critical Item List and their approved vendor list through system.
- Automatic referring and compliance with all Procedures, Office Orders, Circulars and DOP through system.
- Raise Final Indent (FI) for Automatic Procurement (AP) items through system based on - Stock, Dues-in, Past consumption trend, Likely demand considering Capital Repairs / Sudden breakdown etc., Budget availability, Estimated price considering market trend & research
- Trap the details of the fund received from different international agencies
- Create a repository of the different types of bids received as per ICB/NCB/LIB/DCB.
- Support procurement practice / formats as per World Bank guidelines.
- Capability of preparation of Request for Quotation and entering data received by bidders against any RFP.
- Capture the delivery instruction details which include details of the quantity of material, time targets to be delivered and the place of delivery and all details
- Raise purchase orders in local or foreign currency.
- Assign multiple delivery dates for items in a purchase order.
- Keep provision for defining approval workflow for the purchase Requisition and purchase order cycle.
- Keep track of the purchases details along with the audit trails accessible to the higher authorities
- Receive Inspection request from vendors through the system in case the material is to be inspected prior to dispatch at site.
- Keep track of the bills from suppliers and acknowledgement of goods delivered to client.
- Keep track whether the bills received are for 90% or 10%. , payment pertains to a particular schedule of NOA, quantity supplied is as per NOA/ full or part/ short supply.
- Keep track whether the bill is for one consignee or for different consignees and whether any part supply under one or different consignees.
- Keep track whether the rates are as per NOA, whether supplies is within stipulated period or not, whether needs to levy Liquidated Damages.
- Track whether goods Acknowledgment Receipt/Final Acceptance Certificates are attached with the invoices, duly approved by SBU head.
- Match the quantities/rates with the suppliers' bills, Goods Acknowledgement receipt, NOA.

30. **Design Management**

- Record of Design Calculation and drawings for the projects undertaken.
- Capture data required for designing of bridges, tunnels etc.
- Record details on site visit (location, rail road accessibility/soil condition/ground condition/ upload sketches photographs etc.).
- Maintain a version wise repository of the soft copy of design documents.

- Record details for planning, verification, review and validation of design and engineering studies & generation of design/studies status sheet.
- Compile existing data of designs and drawing.
- Maintain the details of the design validation/changes/Proof checking as obtained from the client.
- Provide an interface to the vendor for uploading and downloading of drawing
- Automatically update the structure of the project upon submission of Documents and approval.

31. **Construction Management**

- Provide for a service entry / joint measurement document/MB that should be generated after the work is completed.
- Maintain and manage construction deadlines, delivery date, shipping, assembly/installation, startup data, and confirmed data
- Capture rate list of material required for construction.
- Recalculate cost estimate for the project after contract award when basic engineering have taken place and more information about the project become available.
- Create a repository covering all the packages containing progress status of all the billable/ no billable items, Bill of Quantities (BOQ) having quantum of work and unit rates, status of quality checks etc
- Support accessing/modification of various drawings/documents, Quality Plans, specification etc in various formats like MSWORD, EXCEL, Visio, CAD, PDF etc associated with a project

32. **Inspection Management**

- Record Purchase Order details, support registration of jobs awarded for inspection.
- Maintain the details of the inspecting engineer.
- Support call registration, and assign inspection Engineer for the calls.
- Support issue of instructions to inspecting engineers.
- Should be able to maintain a list of unit of measurement, railway units, zone details, inventory of inspection certificate booklets and holograms,
- Support the registration of the description of the item (Description, Unit Price, Quantity Ordered, and Quantity Offered for Inspection, Quantity Passed, and Quantity Rejected etc.).
- Automatic referring to the Purchase order, amendments , Quality acceptance plan, drawing, detailed specification through an online system
- Support the messaging/ alerting of the call assigning by SMS/email.
- Assign Consignee and Bill Paying Officer.
- Support inter unit transfer of funds.
- Store the details of the cancellation of calls and inspection certificate and cancellation charges if any.
- Register the details of the certificate issued (Book and Set No, Certificate No, Date)
- Generation and issue of inspection certificate (Case no, Call Date & Call Serial No, Vendor Name, Name of Inspection Engineer, PO No. & PO Date / Offer letter No. & Date, Consignee & Bill Paying Officer, Book & Set No., Certificate No & Date, Call

Date, First & Last Inspection Date, Inspection Certificate Date, Item Description, Unit Price, Quantity Ordered, Quantity Offered for Inspection, Quantity Passed, Quantity Rejected etc).

33. **Export Management**

- Track whether RBI approval has been taken.
- Manage applications, allotments and expiration of various export licenses.
- Manage advance licenses in case goods imported for re-export (issue and redemption).
- Generate proof of export for excise rebates.
- Generate CT-1 bond.
- Track details of submission of CT 1 bond to excise authority for endorsement and receipt back of bond and details of bonds with supplier.
- Track receipt of ARE-1 from client.
- Track details of submission of ARE I to custom department, receipt of ARE-1 from customs after endorsement, submission of ARE I and BRC to excise authority after endorsement by customs,
- Automatic triggering for export of goods within 6 months from date of removal from factory
- Keep track of duty drawback of goods in respect of which excise duty has been paid, calculation of duty drawback against shipments as per brand rate and prompt alert for expiry of period for export post exit of goods from factory.
- Manage insurance of each shipment, generate insurance declaration
- **Inventory management** for the materials(details of the warehouse hired, stock register at warehouse, project wise and country wise) and generate inspection report
- Maintain details of freight forwarders, agency commission, define shipping terms and ocean freight based on TT selling rate
- Track short shipment.
- Realize Bank Realisation Certificate
- Manage forms like form H and C issued by sales tax department, generate utilization certificate, DVAT 30, 31 for purchase and sale, and generate sales tax return.

34. **Operation and Maintenance Management**

- Check whether the statutory requirements of PF and labour laws are followed by manpower agencies prior to payment of bills.
- Maintain a list of inventory of maintenance equipment, spares, locos, etc.

35. **Stores and Inventory Management**

- Inquiry & Reporting option for various Inventory Transactions (by item-code, item-type, Cost Center, date of transaction, etc.)
- Inquiry & Reporting for Inventory Status (by item-code, type, etc.), Slow Moving and Obsolete Inventory and Shortages and Backorders
- Tracking items by Item-Code
- Identifying and segmenting Type of material movement
- Option to have various item valuation like moving average, standard etc.

- Generation of receiving documents (e.g. GRN) against purchase order line item, with provision for partial receipts.
- Provision for views of inventory balances, in-transit and on-order across all stores.
- Making stock requirement predictions based on re-order level, safety stock etc.
- Flexible assignment of inventory processing by Items (General Usage / Reserved).
- Conducting ABC analysis for Items.
- Provision to adjust or update for differences or conversions in Unit of Measurement.
- Tracking and controlling store wise Inventory.
- Monitoring and displaying stock.
- Capturing Item Description in the Inventory Master File.
- Capturing associated Unit of Measurement in the Inventory Master File.
- Provision to scrap material and track them.
- Inventory Valuation Reporting.
- Option to run Reports / Inquiries on Inventory Status
- Option to store Item by Serial Number and Location
- Provision to input unique descriptions, cost information and other details with items
- Display of Resources and Inventory availability by Location
- Support for Reallocation of Reserved Inventory across Project / store
- Preventing other projects consuming the materials purchased for one project
- Support for manual update of Inventory Quantities
- Audit Trail of Inventory Adjustments
- Reserving quantity based on requirement from different sites
- Provision to conduct stock transfer between Area to Area, Regional Store to Regional Store etc
- Provision to check available material at different areas, regional store or sites
- Provision of keeping a track of inventory, location etc for export related material
- Provision of maintaining leased material separately in the system
- Get the dispatch documents (e.g. Excise Invoice, Challan, Test Certificate, Guarantee Certificate, VAT documents, MTC) along with consignments checked at Entry Gate to the Plant, to ensure that documents are complete in all respects and in compliance to PO terms.
- Receive any dispatch document from vendors through system in case they were not submitted along with the consignments.
- Raise Stores Receipt (Cum Rejection) Voucher (SRV) through system and to transfer the same to Custody Storehouses online
- Send CENVAT & VAT details to Finance through system.
- Receive Stores Indent Voucher (SIV) through system for the cases where consignments were offloaded at user's site.
- Get consignment details (Bank Documents) through system
- Release the SRV through system for accounting of the material received and making payment to the vendor.

- Generate Gate Pass (Material out pass) through system for taking out the rejected consignments by the vendors.
- Get Excise Invoice from Finance though system for CENVAT reversal cases
- Make accounting of Way Bills through system.

Reports -System should be able to generate the following reports on:

1. Generate the percentage completion of the project based on: the number of activities completed, time spent on the project to the total time allotted for the project, milestones completion.
2. Outstanding Bill details and Bill reminder period wise/ unit wise/ SBU wise/company wise/country wise.
3. Report on Budget vs. Planned vs. Actual cost
4. Bill query based on period, amount, name etc.
5. Query report client wise/sector wise/ project wise/ fund code wise
6. Outstanding TDS certificates
7. Automatic acknowledgement for fee received by email
8. Fee schedule and Outstanding retention money details
9. Direct v/s indirect cost statement SBU wise/ project wise.
10. Sector –wise list of ongoing projects (eg railways).
11. Report on Defect liquidation i.e. resolution of defects.
12. Drawing/Design calculation register.
13. Project wise list of reports submitted by RITES to various clients.
14. Generate report on site visit.
15. Generate activity based Bar chart.
16. Generate hindrance register, work status and material consumption register.
17. List the customer supplied product/information register (description of product/specification, date of receipt and issuing etc.).
18. Listing of purchase requisition/ purchase orders, material movement in project.
19. Create project reports based on project number, project status, responsibility center, project manager, overdue projects, pending EMD, pending TDS etc.
20. Report based on budget and its associated projects
21. Performance reports for ongoing projects/ closed projects during the year.
22. Reports to indicate erroneous cost that need to be transferred to other project.
23. Reports on bill submission to bill payment.
24. SBU wise summarises MIS report / Monthly Progress reports as per RITES formats bringing out milestones and critical areas for top management
25. Reports required for MOR
26. **Document Management-**
    - Report on Project wise list of applicable documents
    - Report on the history of documents downloaded from the individuals
27. **Construction Management**
    - BOQ generation, automatic MB generation based on project progress as against the project plan.

- Generate schedule variances and build scheduled budget histograms, tables and curves
- Report on the details of the work outsourced/ subcontracted.
- Automatic online generation of receipt of material (contract number wise / location wise).

28. **Inspection Management**
    - Daily/Monthly summary of calls marked for inspection engineer-wise/vendor wise/ client wise.
    - Daily/Monthly/Annual details of the calls registered/cancelled/ call status for inspection client wise /Inspection engineer wise (completed/ ongoing officer allocated/ certificate issued/ region wise/ bills raised / revenue generated).
    - Details of discipline wise fee summary.
    - Generate client wise Custom Ledger, checklist for inspection, work completion and quality control.
    - Generate a statement of liquidated damages (client wise, region wise, period wise).
    - Non Railway inspection for ISO.
    - Daily/ monthly report of Inspection status Inspection engineer wise.
    - Billing summary/ details client wise, region wise, sector wise, discipline wise etc.
    - User defined period wise Bills analysis report.
    - Details of the delay in inspection billing.
    - Outstanding statement- client wise, region wise, value wise, engineer wise.
    - Periodic breakup of client wise outstanding based on date, slots chosen by user.
    - Client wise details of un-posted / partly posted cheques.
    - Remittance details – cheque wise, bill wise, client wise etc.
    - Statement for excess or short bills for the period.
    - Details of amount transferred to/from other regions.
    - Performance report of inspecting engineer.
    - Details of client wise/region wise comparison of inspection fees.
    - Details of status of inspecting certificate/missing/ rejected inspection certificate.
    - Details of the cost of inspection, capacity assessments done.

29 **Export Management**
    - Generate details of the rolling stock / machinery/ locomotive purchased and delivered – project wise, client wise, country wise/ annually/ vendor wise.
    - MIS based on customer-wise, country-wise, agent-wise, product-wise, period-wise leasing.
    - Generate export documents (shipping bill, bill of lading, commercial invoice, bank documents etc), packing list of multiple orders, generate order wise shipment plan
    - Generate letter to customers and banks, licenses application, license possession report, license utilized, license sold, claim o/s in licenses.
    - Generate details of the warehouse hired, shipment arrangements, insurance management made during shipment of rolling stock and dispatch of consignment.

- Export register, export realization, o/s, export margin, export expenses, export benefits,
- Generate excise bond and bond ledger.
- Report on exchange gain/loss and certificate of origin.
- LC Status report.
- Forward booking contract report.
- Details on whether ARE-1has been received from supplier or not
- Details of physical verification and deviation.
- Inventory costing on FIFO basis.

30 **Training Management**

- Provision to capture the bio-data details and feedback from trainees.
- Generation of training calendar, list of trainings conducted (period wise/country wise/ institute wise)
- Training expenditure details / revenue details.
- Generate Training certificate

31 **Material Supply management**

- Details of the funds received / unspent funds from different agencies.
- Bid type wise (ICB/NCB/LIB/DC) tender floated.
- Details of the payments made to agencies against the material procured.
- MIS covering details of material ordered, supplied and paid-vendor wise, consignee wise and product type wise.

32 **Contract management**

- Details of the Minimum Requisite offers not received on date of Tender Opening
- Details of the Summary of orders placed section wise, group wise and party wise between two dates

33 **Inventory Management**

- Details on Final Indent Query
- Details on Inventory Reports –Monthly
- Details of Utilization of Non-Moving items- Monthly
- Details of List of no. of high value items in inventory w.r.t. value
- Details on Disposal of Wear Scrap & Surplus Stores & Spares
- Details of Lead Time of SRV Raising /Releasing separately for pre inspected consignments and consignments inspected after receipt.

d) **Stage- Project Completion and Closure**

Requirements- System should be able to provide the following features:

1. Record/modify/retrieve the Performance Guarantee parameters.
2. Activity confirmation in accordance with the contract.
3. Monitoring of the contract closure, recording of activities related to handing over of the building/ study report or system.
4. Monitoring of the site closure phase once the construction/project conclude.
5. **Result Analysis**

- Track whether the milestones defined for the vendors are achieved.
- Check whether the project completion is as per customer satisfaction, requirements.
- Capture the performance details of sub-contractors/ sub consultants.

6. Capture arbitration cases/ legal cases for projects against clients (details of proceedings).
7. Capture the feedback/complaints from clients.
8. Able to group comments and feedback (eg strengths and weaknesses, contractor performance, quality, cost, time etc) for a project.
9. Ability to capitalize cost and automatically transfer them to fixed asset registers in case of capital projects.
10. Capable of recording the physical completion of projects/jobs.
11. Prevent closing of a project where project is financially open.
12. Capability of re-opening of closed projects.
13. Notify all appropriate personnel that a project is no longer active.
14. Integrate Project Management with accounting journals.
15. Ensure Final costs transfer to general ledger only on project completion certification.
16. Identify and Transfer the assets created through works under project cost control on completion for entry to the asset register

Reports -System should be able to generate the following reports on:

1. Project wise audit report to monitor and compare planned and actual cost
2. Report on BG/PG to be released against the project.
3. Generate project completion certificate and work completion certificate.
4. Generate performance appraisals report for contractors,
5. Generate reconciled position of client funds for settlement and recoupment
6. Details of projects financially open but physically closed.
7. Outstanding details during a financial year.
8. Financial position of SBU (turnover, Operating ratio, business secured etc).
9. Quarterly status of arbitration cases/legal cases.
10. List of projects physically completed during the month/year.
11. Generate the feedback/customer complaint form and the details of the client feedback
12. Generate customer perception analysis report, histogram of complaints received from customer, current status of complaints and time taken for resolution.

e) **Stage- Post project Completion- Maintenance**

Requirements- System should be able to provide the following features:

1. Ability to record the warranty and maintenance clause in the system.
2. Depute manpower and resources for the maintenance.
3. Keep a log of the activities undertaken for the client during maintenance.
4. Assess the impact of the project on the company's resource utilization

Reports -System should be able to generate the following reports on:

1. Generate details of Project AMC (budget, expenditure , activities, revenue raised detail)
2. Generate a list of the calls registered and attended during maintenance.

Section II

1.5 Other Activities

Other activities handled by SBU, related to the projects either directly or indirectly are

Sno	Activities	Remarks
1	Training	Identification of staff training needs, nominating staff for training and sending request to training department for organization of the same.
2	Manpower Planning	Identification of manpower need for current and future projects. Request for recruitment of manpower to HR department.
3	ISO	Development of ISO procedures for department, compliance, ISO audit.
4	Technical Up gradation	Identification of new technology equipment, software, hardware needs for projects and its procurement.
5	Financial Monitoring	Financial monitoring of the SBU (turnover, expenditure, overheads)

Chapter 2
Finance and Accounts

An organization requires up-to date financial data for planning, budgeting, forecasting, analysis, and statutory reporting. This financial information aids in proactive timely decision making and strategizing business performance, thereby assisting in achieving a company's long term goal. Sometimes this critical data is scattered across multiple disparate database and application which is difficult to consolidate. It is essential to integrate the department's business process to drive business performance, manage risk, drive down cost and enable continuous improvement. A Financial Management System should be able to perform regulatory compliance, efficiency, profitability, risk management, analysis and performance apart from its traditional functions of accounting and making balance sheets.

2.1 Function of Financial Management System in RITES

In present accounting system of RITES Ltd, accounts are prepared taking into consideration the existing accounting standards and various laws and various changes in statutes are considered for preparing the accounts and Balance sheets. Eg presentation of accounts is as per the existing Indian & Global Accounting Standards like **IFRS.**

Periodic financial statements are prepared Region wise i.e Western, Eastern, Southern and are consolidated at the corporate office level which also consist of Head office units (Rupee, Dollar, Pound, Euro, Local currency), Inspection unit, Delhi & PO Lucknow for compilation of the standalone financial statement of the company. RITES also prepares and presents consolidated financial statements.

RITES is in the process of transition to conversion to IFRS, henceforth the ERP system should facilitate more than one system/method of accounting, compilation, reporting, etc.

Functions of Finance and Accounts in RITES are as follows:

General Accounting and Reports

1. Keeps track of all the vouchers entered and the master directories.
2. Depending on data entered in Directories, the vouchers are punched, validated and stored.
3. Making inter unit reconciliation and reconciliation with head office.
4. Preparation of books of accounts as per statutory requirements like companies act, income tax act, accounting standard, requirements of schedule VI & other updations like IFRS etc.
5. Preparation of Financial Statements and generation of different kind of reports like general ledger, Subsidiary ledger, bankbook, journal, trial balance, Balance sheet, Profit and Loss account, consultancy fee ledger, tour advance o/s, LTC advance o/s, consultant payment, etc.
6. Notes to accounts including Segment accounting,
7. Details with regard to JVs/ Subsidiaries

Revenue Accounting

1. Raising of invoices on the basis of terms of contract
2. Invoicing the income under various heads like consultancy income, construction project, export, inspection fee, lease service, bank interest income, interest income from loans and advances, income from sale of assets, tenders, scrap sale, dividend income, export incentives, rental income, exchange variation, claim income and miscellaneous income.

3. Checking if the income is to be booked under revenue head or can be categorized as WIP.
4. Preparation of details of income due and income accrued but not due.

Expense Accounting

1. Recording of all the expense vouchers.
2. Grouping under various heads like employee costs, travel expense, stores & spares, building rent & maintenance, various provisions like provision for debts, TDS, diminution in value of investments etc, exchange variations, prior period expense, rates & taxes, printing expense, & other miscellaneous expense.
3. Preparation of details of expenses payable and prepaid expenses.

Fixed Assets Management

1. Keeps track of all the fixed assets of the company giving their location, issuance etc.
2. Maintenance of fixed asset register showing details of all fixed assets procured, sold, transferred to units.
3. Making revaluation & impairment of fixed assets
4. Making schedules of fixed assets as per companies act, income tax act etc.
5. Calculation of depreciation of each asset as per their respective rates for a given period by using the straight line method and report generation.
6. Linked with the general accounting system.

Bank Reconciliation and Banking

1. Punching of payment and receipt vouchers.
2. Reconciliation with data received from different banks and a reporting of un-reconciled data.
3. Issue of cheques and maintenance of cheque register.
4. Making online payments through ECS.

Bank Guarantee

1. Keeps track of all the bank guarantees made by Rites and by clients, their expiry, validity, extension, confirmation, cancellation etc.
2. Each Bank is given a different series of Control numbers so that a system generated distinct unique No. can be given to each BG whenever made.

Treasury, Fund, Investment and currency risk Management

1. Keeps tracks of all investments made by RITES
2. Keeps track of all RITES FDs, client FDs, maturity detail, FD amount, rate of interest, etc.
3. Each FD is given a reference number starting from 1 for different banks so that bank wise, FD wise detail can be generated.
4. Short term and medium term planning of investments depending upon the funds available
5. Preparation of cash flow and funds flow statements
6. Linkage with general accounting system to generate vouchers.
7. Monitoring of receipt of foreign realizable and hedging process including empanelment of bank for etc

Tax Management

1. Management of all applicable direct as well as indirect taxes
2. Keeps track of Service tax payable, TDS, Non taxable amount, etc and generate required taxation reports and TDS certificates.

3. Service tax and TDS detail for the fee received and party payments are maintained separately during the process of voucher entry and relevant reports and ledgers are generated for a given period based on the data present.
4. TDS reconciliation with the deductions made by clients on account of TDS.
5. Keeps track of details of all cases related to income tax, sales tax, WCT, service tax etc pending in the department for assessment

Vendor Management

1. Maintenance of details of vendors like name, address, PAN, TAN, payment terms, TDS details, currency etc.
2. Maintenance of data of Bills received from vendors
3. Making payment to vendors & details like Bills Cleared, time taken to clear the Bills etc.
4. Reconciliation of balances at the year end.

Debtors Management

1. Maintenance of details of client like name, address, PAN, TAN, billing, payment terms, TDS details etc.
2. Maintenance of data of Invoices raised to clients
3. Receiving payment from clients.
4. Reconciliation of balances at the year end.
5. Keeps track of retention money, TDS, EMD etc. and provides outstanding position of the same from time to time.

Other receivables

1. Bill wise TDS certificates, Retention money receivable from each client.
2. Maintain client wise earnest money details.
3. Details of amount recoverable and other advances

Budget

1. Preparation of capital budget and revenue budget
2. Sets performance target of each Division/ SBU.
3. Turnover, expenditure targets are set by management based on the data provided by SBUs.
4. Tracking the over and under budgets
5. Linked with general accounting system for generating vouchers.

Query System

1. Generate different kinds of output as per the user requirements from the vouchers punched.

Audit trail

1. Audit details and schedules

Project Costing

1. Evaluates the Project wise performance of each SBU.
2. Calculates turnover, expenditure and distributes overhead from the actual financial data.
3. Man power utilization system – man days recording, accounting and variance analysis etc.
4. Linked with project estimate directory, financial data and project code directory.
5. Overhead Accounting, allocation, absorption etc.
6. Inventory Management.

Project Client Accounting

1. For Deposit/Turnkey Work-
   - Managing project account, client funds accounts, Project wise vendors' ledger, Project MIS report, Security ledger, statutory compliance, Bill tracking,
   - Reconciliation between client funds and bank account,
   - Maintenance of Works tax registers etc.

Export and lease business segment

1. Procurement of material, Inventory management, Store Accounting,
2. Export sales, Leasing contracts,
3. Excise duty compliances, Sales tax/VAT compliance, Shipment arrangement, Insurance management, Duty draw back arrangement, Export incentives
4. Bank guarantee, Letter of credit –coordination and documentation,
5. MIS - business segment country wise, client wise, sector.

Inspection office accounting

1. Client records, billing, inspection report, MIS and accounting etc
2. Revenue accounting is linked to test/ inspection certificate issued by units/inspection office
3. Client accounts are maintained in category as a cluster such as railways, private, foreign etc. However big value contracts are separately maintained.

Internal audit

1. Inspection Processes to confirm compliance of guidelines, procedures and liaison with external internal audit.
2. Reports for management and audit committee.

Project Progress report (MPR)

1. Compiled by each SBU with details like projects secured(domestic & international), ongoing projects details, contracts secured, client feedback, projects completed during the year, offers submitted/pending etc.
2. At corporate level – MIS with details/reference to projects status in railway sector

MIS

1. Evaluates the performance of each Division/ SBU.
2. Calculates turnover, expenditure, operating ratio, contribution and outstanding for each business unit and division
3. Distributes Corporate/ Divisional overhead from the actual financial data to the business units.
4. Linked with Budget, financial data and project code directory.
5. Business secured, Outstanding – Fee, retention money, EMD etc.

2.2 Requirements and Reports for Financial Management System

General Accounting

Requirements- System should be able to provide the following features:

1. Define and relate the Company, Department/ Division, SBU, Project Office, Activity, Cost element, locations & support amending/deletion of departments etc.

2. Define country, regions, sub-regions to meet legal requirements i.e central taxes/duties, state taxes, local taxes etc.
3. Define new fiscal year including starting month and end month.
4. Allow keeping of multiple period open across financial year.
5. Support capturing of provisions of Accounting Standards, Accounting policy of RITES, procedures and general terms & conditions of contracts.
6. Should capture master data records of accounting system, accounts details, Currency, Taxation, Unit code.
7. Feed the foreign currency exchange rates into the system and automatically calculate and post unrealized gain/ loss on exchange and monthly evaluate gain/ loss in respect of exchange rate fluctuation.
8. Track all foreign currency transaction in both transaction currency and base currency.
9. Perform monthly/ quarterly/ yearly closing.
10. User defined chart of accounts with grouping and consolidation for similar/ dissimilar chart of accounts.
11. Common grouping and coding methodology of accounts covering all offices.
12. Opening of past period for adjustments (e.g. to reopen a period that has been closed).
13. Define threshold limit in case of prior period items/prepaid expense to be transferred to profit and loss account or prior period expense or prepaid expense.
14. Automatic numbering of account codes, Add/Delete/block/edit accounts, its description, activity status to accounts (e.g. active, inactive).
15. Allow mass creation/ copying of GL accounts.
16. Search account code, account name or responsible area during documents posting and resume voucher, at a later time, that are incomplete or imbalance.
17. Can block general ledger accounts if posting is to be blocked.
18. Restrict access to certain accounts by user defined group.
19. Post journals with user definable rules (e.g. apportionment of expenditure, man days deployment).
20. Allow closing of fiscal period to restrict transaction posting.
21. Prohibit posting to close periods within GL and other sub systems.
22. Specify templates to capture details of recurring transactions. (e.g. fixed prepayments and accruals) and allow amendment or deletion to such transactions prior to posting.
23. Allow multiple account entries (debits and/or credits) for each transaction type.
24. Enter statistical information during posting. (e.g. material consumption units and other requirements of schedule VI).
25. Perform On line processing.
26. Allow reversal of vouchers with date/ reason for reversal
27. Able to detect duplicate entries.
28. Define the person entering voucher and checking authority of voucher and restrict checking of voucher by the person who prepares it.
29. Support uploading supporting documents with voucher.
30. Allow grouping of cost center in a tree structure.

31. Allow transfer of cost from one cost center to another cost center (manually, pre defined criterion/ formulae).
32. Flexibility to retain original information of cost even after transfer.
33. Ability to extract balance sheet and profit and loss account SBU wise, Division wise, project wise and inspection offices.
34. Prepare a consolidated Balance Sheet, Profit & Loss account, incorporating financial statements of subsidiaries and JV's as per AS & IFRS.
35. Consolidate financial statements of all regions in the country and outside country and prepare consolidated as well as standalone Financial Statements at corporate level in local currency as well as foreign currency.
36. Automatic calculation of Basic earnings per share based on pre determined formulae.
37. Electronically route voucher for approval before posting to the GL. If rejected, it should be automatically routed back to originator for correction.
38. Support inter unit reconciliation and reconciliation with head office along with automatic preparation of reconciliation. Statement.
39. Automatically initiate a new financial year and update the closing balance of the previous period and opening balance of the current period.
40. Automatically transfer net profit for the current year to retained earnings account. (for yearend closing)
41. Support calculation of various ratios and make ratio analysis.
42. Breakdown of balances by drilling down to source document & GL account master data.
43. Availability of system generated numbering for various documents of each financial transaction.
44. Numbering sequence of all documents is reset for each financial year.
45. Option to capture due dates for security deposit, clearing accounts etc and query/reports to highlight deposit/advances which are due for repayment.
46. Generate error report in case of rejection or any errors at the time of data entry.
47. Able to trap the movements of bills and other supporting documents
48. Integrate with Project Management, Human Resource Management, Payroll, PF and other software in RITES

Reports

1. Reports like general ledger, subsidiary ledger, bankbook, journal, Balance sheet, P & L account, notes to accounts including schedule of balance sheets and profit & loss account, Segment accounting, Other requirements of Schedule VI, Earnest money, security deposits, retention money, bank guarantee received and issued, inventory in hand valuation, loans accounts, deposit accounts, expense payable, advances, Outstanding, consultant payment, etc for whole organization, division etc and for user defined period.
2. Detailed Trial balance including opening, transaction & closing balance and summarized trial balance division wise, location wise, unit wise and organization as a whole for the year or for the user defined period
3. Reporting of financial statements as per **accounting standards, IFRS** etc.
4. Define related parties as per accounting standard and generate report on transactions with related parties.

5. Provide various reports required by Comptroller & auditor general of India for audit.
6. Query based on account codes and name, period etc.
7. Report on prior year transactions posted in the current period, future period transactions posted in the current period
8. Provide customized Report Writer with specific format, graphs & layout of reports.
9. Report on transactions with regard to JVs/ Subsidiaries
10. Generate comparative statement of balance sheet, profit and loss account and trial balance for period selected by user.
11. Report on foreign currency entered during a period.
12. Generate bill forwarding register.

Revenue Accounting

Requirements- System should be able to provide the following features:

1. Support automatic numbering of invoices raised
2. Support request note and activity completion certificate/ duty signed note from SBU to finance for raising of invoice to client.
3. Automatic billing based on % of completion, work done, built up cost, stage wise, job wise, man month wise, lump sum, periodically(monthly) in case of lease by considering the tax liability to RITES or client.
4. Support special type of invoicing like
    - Construction- material and services
    - Export- material, services, freight etc.
    - Inspection- job accounting
    - Lease- monthly lease rentals, maintenance etc
    - Operation and maintenance- loco wise billing, operation & maintenance charges in case of wet leasing loco wise, railway facility, overhauling scheduling
5. Support booking of revenue under various heads like
    - Consultancy income,
    - Construction project,
    - Export incentive,
    - Inspection fee,
    - Lease service,
    - Bank interest income,
    - Investment income,
    - Interest income from loans and advances,
    - Advances to staff
    - Income from sale of assets,
    - Tenders, scrap sale,
    - Dividend income,
    - Export incentives,
    - Rental income,

- Exchange variation,
- Loans to joint ventures,
- Claim income including insurance claim
- Miscellaneous income.
- others

6. Support billing of reimbursable from clients.
7. Support uploading of documents required for raising invoice and allow invoicing only after all relevant documents are uploaded
8. Prompt for non billing even on expiry of due date for billing
9. Automatic transfer to WIP if physical work progress is less than 15 % of total contract/project and reversal in the next financial year.

Reports

1. Generate invoice in 5 copies indicating client address, description of project, activities for bills raised, contract/LOI no, service tax, adjustment of mobilization advance etc.
2. Reports on invoices raised period wise, client wise, region wise.
3. Generate report of cancelled invoices.

Expense Accounting

Requirements- System should be able to provide the following features:

1. Support automatic numbering of all expense vouchers
2. Support special type of invoicing like
   - Construction- material and services
   - Export- material, services, freight etc.
   - Inspection- job accounting
   - Lease- monthly lease rentals, maintenance etc
   - Operation and maintenance- loco wise billing, operation & maintenance charges in case of wet leasing loco wise, railway facility, overhauling scheduling
3. Support booking of expense under various heads like employee costs, travel expense, stores & spares, building rent & maintenance, various provisions like provision for debts, TDS, diminution in value of investments etc, exchange variations, commitments, prior period expense, rates & taxes, printing expense, & other miscellaneous expense.
4. Calculation of provision for debts, TDS, diminution in value of investments, incentives, PRP, bonus, SSG, awards, warranty, dividend, excise duty bonds, tax etc.
5. Support uploading of documents required for processing of expense voucher and allow payment only after all relevant documents are uploaded

Reports

1. Reports on expense booked period wise, client wise, region wise, business unit wise, accounting code wise.
2. Report on ageing of expense payables

Fixed Assets Management

Requirements- System should be able to provide the following features:

1. Keep assets under groups, subgroups and blocks component wise along with its number, date of purchase, date of manufacture, manufacturer serial no, vendor and cost etc
2. Support procurement form Corporate Office and other units outside corporate office and generate a unique asset identification number on each purchase of asset.
3. Support capital procurement of assets like Loco to be used for lease.
4. Support valuation of intangible assets or internally generated fixed assets like software etc.
5. Automatic integration with GL, Project Management and Budget.
6. Transfer asset between departments, divisions, location, SBUs, Intra SBU at particular date.
7. Keep historical data if the change in the location and quantity of asset takes place.
8. Compute depreciation of each asset as per their respective rates monthly/pro rata basis by using straight line method/ written down value method etc keeping in view RITES policy and Companies Act.
9. Support mass change in rates of depreciation.
10. Support change in useful life of asset or change in rate of depreciation.
11. Support sale of asset and compute gain/loss on sale of each asset.
12. Support revaluation/impairment/ physical verification of asset at any point of time.
13. Able to prepare annual plan for fixed assets.
14. Allow calculation of depreciation of assets for books of accounts, income tax act, MIS, costing etc.
15. Allow defining of a threshold value below which the asset is fully depreciated.
16. Allow calculation and posting of depreciation on monthly basis.
17. Allow depreciation calculation of revalued portion and charge revaluation depreciation on revaluation reserve.
18. Option of calculation of depreciation with retrospective effect in case of change of method or rate of depreciation and calculate prior period items posted during current financial year.
19. Support nominal value of fully depreciated fixed assets.
20. Support insurance of assets and keep track of insurance claim filed and received
21. Maintain last physical verification in the Fixed Asset Register.

Reports

1. Generate SBU wise/ cost center wise/ unit wise / consolidated fixed asset register giving details of asset no, part no, accumulated depreciation, date of purchase, original cost, additions and deletions, location, unit of measurement etc.
2. Generate employee wise report of assets/ asset location history.
3. Generate asset wise purchase report, sale report, depreciation report, date wise/ period wise.
4. Generate reports of assets for financial purpose/ budget/ management.

5. Fixed assets and depreciation schedules of Balance Sheets as per I Tax Act and as per accounting standards/ companies act giving details of opening balance, purchase, sale, rate of depreciation, depreciation amount and closing balance.
6. Generate report of gain/loss on Assets Sale.
7. Generate asset disposal register.
8. Generate physical verification report, discrepancies report, report on reasons for discrepancies and action taken.
9. Generate report on transactions during the year i.e. purchase of new asset, sale of asset, detail of sale, transfer, written of, costing of salable asset etc.
10. Generate ageing of fixed assets.
11. Generate assets insurance and insurance claim register.

Bank Reconciliation and Banking

Requirements- System should be able to provide the following features:

1. Define banks and bank accounts of RITES.
2. Allow entry of bank statement details manually or uploading by electronic means.
3. Allow defining the criterion for bank re-conciliation and provide flexibility for Electronic bank reconciliation based on pre-determined criterion.
4. Allow maintenance of cheque stationery and tracking of cheques based on available stationery and usage.
5. Post entries for cheque receipts and cheque payments.
6. Allow entry of Post Dated Cheques on a future date and current date.
7. Record stop payment of cheques
8. Enable the matching of multiple receipts in the system with a single receipt transaction on the bank statement
9. Transfer funds from collection bank account to Head Office bank account.
10. Support cheque printing.
11. Able to capture a list of signatories for cheques.
12. Allow cheque issue only on availability of funds in bank.
13. View and print cheque deposit statement for a day.
14. Option of sending payment details to banks electronically.
15. Allows printing of payment advice along with cheques to be sent along with the cheques to recipient either electronically or manually.
16. Allows printing of receipts along with cheques to be sent to the client either electronically or manually.
17. Inform respective department, division or unit upon issue of cheque electronically.
18. On printing of cheques update payment voucher, cheque register.
19. Support recording of cheques in hand at the year end.
20. Update cheque register in case cheques are damaged / destroyed.
21. Identify stale cheques and provide details of stale cheques.
22. List of all cheques made void from cheque register.
23. System should provide list of all pending cash payment.

Reports

1. Generate a report of un-reconciled data/ Bank reconciliation statement.
2. Generate a daily/ period wise report of a list of cheques printed to a particular party.
3. Generate report on party wise daily cheques received/ issued/cancelled.
4. Generate cheque deposit slip, payment advice and bank correspondence letters.
5. Generation of cheque register and report on stale cheques.
6. Generate report on list of cheques issued/ received which are dishonored by bank.
7. Generate text file in the format provided by the bank for RTGS and EFT payment.
8. Generate a list of all payments made through E-payment method.

Bank Guarantee

Requirements- System should be able to provide the following features:

1. Allow entry of bank guarantee details by date of issue, expiry, validity, extension, confirmation, cancellation, purpose etc.
2. Allow entry of any counter guarantee given/margin money details.
3. Keeps track of all the bank guarantees made by Rites and received by RITES
4. Allow Prompt alert at least two months earlier on expiry of BG and intimate bank and party upon expiry of BG
5. If bank guarantee amount is equal to or less than Rs. 25 lakhs, prompt for reconfirmation from issuing bank on annual basis and if BG amount exceeds Rs. 25 lakhs, prompt for reconfirmation on half yearly basis.
6. Prohibit processing of bills if BG is expired.
7. Online authorization for release of BG only after performance period is over.
8. Availability of the standard checklist formats for the verification & acceptance of these BGs.

Reports

1. Report of list of BG issued and received Bank wise, SBU wise, party wise, date wise and user defined period wise.
2. Report on BG going to expire after/on/before a particular date.
3. Generate letter to bank for new BG, confirmation, renewal, cancellation of BG and reminder for renewal.
4. Generate exception report of BG expired but not renewed.
5. Generate bank guarantee receipt register.
6. Generate a letter of extension of the BG in case the extension is required.
7. Bank wise, project wise, vendor wise report for the BGs received and sent for confirmation for which confirmation not received.
8. List of expired BG's– Project wise/department wise/ package wise/ bank wise/ party wise.

Letter of Credit

Requirements- System should be able to provide the following features:

1. Generation and establishment of LC request.
2. Automatic linking of the LC with the payment terms of the PO.
3. Maintain a check that the LC amount should not exceed the amount payable through LC for each line item of PO
4. Facilitate the monitoring of LC and LC limits.
5. Ensure validity of LC, unutilized amount of LC should be available online.
6. Enable amendment of LCs
7. Negotiation of documents

Reports

1. Report showing bank charges paid for opening of LC account P.O. wise.
2. Monitoring of LC limit Bank wise.

Treasury, Fund, Investment and currency Risk Management

Requirements- System should be able to provide the following features:

1. Allow for short/medium/long term parking of funds from Bank balances, maturing deposits, investments, receivables and payables, payments of wages and salaries, investments and borrowings, dividend payment, tax payment/payables etc.
2. Should be able to record cash transaction and post accounting entries for those transactions.
3. Support funds/investment planning as per DPE guidelines.
4. Keeps track of all the RITES FDs and client FDs, their details.
5. Support intimation to Ministry of Railways if investment is more than 3 years.
6. Forecast cash outflow and inflows based on income and expenditure trends, Receivable and Payable due dates, fixed deposit and borrowing terms, project inflow & outflow.
7. Track investments encashed before maturity.
8. Automatically compute for interest calculation, accrual calculation, cash flow generation, etc.
9. Provide historical data, cash flow and yield / return on individual investments and Avg. return on all and each category of Investments.
10. Define items for non cash nature for the purpose of cash flow statement
11. Prepare cash flow statement as per applicable accounting standard.
12. Perform ‘What if’ analysis on cash flow based on user defined assumptions.
13. Compare actual cash/bank balance against forecast cash outflow.
14. Compute forecast excess or deficit in bank account
15. Linkage with general accounting system to generate vouchers.
16. Calculate interest based on value date captured in the system.
17. Capture payment made by banks or to be made against Letter of Credit.
18. Calculate accrued interest on loans and interest.
19. Provision for TDS deducted and certificate received for funds planning.

20. Support hedging of currency (minimum 25%).
21. Support fixing of benchmark(reference rate) for currency

Reports

1. Produce forecast cash flow statement showing opening balance, cash outflows, revenue expenditure, tax, dividends, cash inflow, Interest received and Closing balance date wise, location wise, project wise, division and SBU wise.
2. Produce separate forecast cash flow statement in respect of foreign currencies.
3. Report of comparison between actual cash flows with forecasted cash flows
4. Bank wise generation of FD register and FD under margin report.
5. Generation of investment register instrument wise showing % of total investment.
6. Report showing trend of inflow, outflow and balance of funds
7. Generate hedging ratio.
8. Daily report on
    - Fund Report – Treasury
    - Investment Portfolios wise and date wise
    - Investment Register
9. Weekly report on
    - Maturities & Interest Receipt Schedule
    - Weighted Average Return (WAR) on Investments
10. Monthly report on
    - Flow of Investments (Increase/Decrease)
    - Investment. / TDS and Income Earned
    - Bonds Redemption Schedules

Tax Management

Requirements- System should be able to provide the following features:

1. Support Service tax, Income tax including TDS, VAT, wealth tax and other taxes in India and allow recording various provisions of various acts.
2. Define parameters and rates of tax deductions and automatic tax computation while entering the voucher, including TDS on provisional expense.
3. Attach the Generated Forms/Letters in Document Management Software.
4. Support capturing of challan forms under various acts & generate filled in challans for tax deposits.
5. Automatic calculation of monthly/quarterly/annual tax payments and compute advance tax, deferred tax by adjusting tax credits/ cenvat credits.
6. Prompt alert on due dates of various taxes.
7. Compute interest on delayed payment of taxes.
8. Recording of reasons for delay in deduction and deposit of tax.
9. Pre filling of the Form/Letter with Client Details, etc.
10. Allow for e –filing under various tax laws.

11. Submission of quarterly returns of TDS for professionals, contractors, rent, and non residents (Form 26Q, Form 27 Q)
12. Automatic generation of TDS certificates and also allow duplicate certificate with words 'Duplicate' on the certificate.
13. Allow manual customization based on changes in various tax laws, and change in the salary structure.
14. Entry of various pending cases in departments and their status.
15. Keep a record of reply to notices of income tax department on TDS and quarterly return issues/
16. Should be able to bifurcate TDS received in the current year and other than current year.
17. Reconciliation of TDS certificates with income tax department.
18. Support preparation of revised returns under various laws.
19. Support preparation of schedule for Tax audit.
20. Keep the details of the dividend tax payment and withholding ta

Reports

1. Generation of TDS certificates at the time of payment of invoice/ consolidated at the year end.
2. Generate Tax Forms in various taxes of India.
3. Generate Standard Letters to Department and Clients.
4. Generate various returns under various tax laws like service tax, income tax and other applicable taxes.
5. Generate exceptional reports for errors in returns.
6. Generate various customized MIS and reports for taxation.
7. Generate register of cenvat credit taken for service tax and excise duty paid
8. Generate register of TDS certificates issued to parties and received from parties.
9. Generate report of pending TDS certificate to issue and to receive
10. Report on cases in various departments—pending and settled.
11. Reconciliation report of TDS with certificates received/information provided.
12. Report on delay in deposit of TDS and TDS deducted but not deposited.
13. Quarterly report on statutory compliance of TDS and deviation of TDS.

.

Vendor Management

Requirements- System should be able to provide the following features:

1. Allow automatic generation of vendor no.
2. Capture master data of vendors like name, address, PAN, TAN, Service tax, VAT, PF , ESI Registration no, bank detail, guarantee, security, payment term, currency, state, email id, TDS related information, insurance policy, labour licence, legal status, micro/medium/ small scale enterprise category etc.
3. Define standard payment terms i.e. Payment after specific number of days, early payments, retention money, etc.
4. Segregate details of vendors on the basis of advance, security deposits, guarantee, LC etc.

5. Automatic deductions of TDS, security deposit etc based on pre determined criterion.
6. Support capturing of various contract details for vendors.
7. Process payment to vendor on the basis of milestone achievements taking into consideration data from BOQ, MB etc.
8. Able to receive certified bills, billing schedule, approved note sheet, analysis report, measurement book, BG, concurrence, work completion certificate
9. Perform rate verification and compute payment amount for bill after all deductions online.
10. Allow linking of vendors with customers where a company is both a vendor and a customer.
11. Define criteria for vendor performance and support rating of vendors for assessment of performance of vendors.
12. Provision to blacklist/blocking of vendors so that transactions for such vendors cannot be entered.
13. Allow various TDS/sales tax rates to attach to the vendors data.
14. Allow clearing of vendor transaction by matching open, debit and credit items.
15. Allow invoice processing on the basis of goods receive note/job note/ service entry note.
16. Support three way match of PO/GRN/vendor invoice for bill passing process.
17. Consider quantitative details from GRN and price details from PO during three way match.
18. Track duplicate invoice based on vendor code and invoice number.
19. In case of labour bills the system should have the ability to check individual time assets.
20. Post debit notes and credit notes as well as print those for sending to vendors.
21. Calculate overdue interest for vendors based on individual transaction due dates.
22. Allow payments to vendors against one or multiple invoices/ partial amount against single invoice.
23. Block certain vendor invoices so that they cannot be paid unless cleared by appropriate authority.
24. Automate payment processing system- run program on future date, invoice identification, process multiple payment as per the specified dates and post accounting entry in bank account as well as vendor account.

Reports

1. Report of vendor wise bills received, paid, advances paid, pending, LC, security deposits and BG and time taken in clearing bills.
2. Report of vendor wise advance and adjustments, milestone achievement.
3. Report of vendor wise TDS certificates issued and pending.
4. Report of ageing of vendors, analysis of vendor accounts due date wise
5. Reports of list of vendors (division wise, location wise) showing debit balances/credit balances.
6. Vendor account trail balance.
7. Letter of confirmation of balances to vendors.
8. Report on pending GRN.

9. Report on vendor – wise PO, GRN, invoices etc.
10. Report on payments made before due date and cash discount earned
11. Generate daily passed bills Register.
12. Report on details of payments segregated into onetime payment, early payment and delayed payment.

Debtors Management

Requirements- System should be able to provide the following features:

1. Capture master details of clients and maintain client wise bills, receipts, bank guarantees, terms of payment, retention money etc.
2. Keeps track of all bills raised & provide outstanding position of the same period-wise.
3. Segregate details of clients like advance, security, guarantee etc.
4. Record reasons for non collection of o/s payments.
5. Support provision for doubtful debts for outstanding more than three years and are doubtful to recover.

Reports

1. Report of client wise bills raised, payments received, outstanding, under litigation, time taken in bills receipts.
2. Report of client wise advance and adjustments, milestone achieved and bills raised.
3. Report of ageing of outstanding payments
4. Generate letter of o/s bills reminders (Collective/ Individual reminder)
5. Reports of list of vendors showing credit balances
6. Letter of confirmation of balances to clients.

Other receivables - TDS, RM, EMD, Advances etc

Requirements- System should be able to provide the following features:

1. Capture Bill wise TDS certificates, Retention money receivable from each client.
2. Client wise earnest money details.
3. Keep track of all realized retention money and provide outstanding position of the same.
4. Record reasons for non collection of o/s TDS certificates, retention money & EMD.
5. Record the details of the EMD received (tender no. against which received, party reference, issuing bank details, mode of EMD, EMD no., date, validity, amount etc.) and acknowledgement issued to the vendor.

Reports

1. Monthly age wise report of pending TDS certificates, retention money, security deposits & EMD client wise.
2. Report on ageing of advances and other recoverable.
3. Generate letter of reminders to clients.
4. Particular bid- vendor wise, vendor - bid wise report giving the details of EMD.

Budget

Requirements- System should be able to provide the following features:

1. Create the Revenue budget, Expenditure budget, Capital Expenditure budget with the assistance of inbuilt templates.
2. Prepare separate budget for domestic, international projects.
3. Allow budget preparation w.r.t. SBU, Division, Cost Center, Profit Center, Corporate Office, Project Office, Inspection office,
4. Capture corporate and other functional guidelines to assist in preparation of revenue budget and capital budget.
5. Enable categorization of on-going, new and completed schemes.
6. Accept inputs from various expenditures under different heads for monitoring utilization of budgets.
7. Enable revision, enhancement, transfer and approval of budget estimates.
8. Assign targets based on user defined benchmarks or system generated formula driven targets.
9. Prompts alerts, warnings, mails, errors, when the actual expenses reach certain percentage on budget or exceeds the budget.
10. Allow preparation of budget by SBU/ division heads and further amendments by ED
11. Preparation of budget on the basis of ongoing and expected projects, manpower requirements in physical and financial terms (Man month rates basis), slippage resulting in cost over runs in projects both in physical and financial terms, training expense, marketing strategies and BD expenses, outstanding dues in terms of number of days to the turnover and internal services provided to /from other SBUs.
12. Prepare capital budget taking into consideration capital investment in equity in BOT/ Concessioning projects
13. Import or export budget details from/ to external systems electronically (e.g. Spreadsheet)
14. Support multiple hierarchy levels of departments, SBU, divisions, regional offices, Corporate office.
15. Capture data by account head chart of accounts and linking about their type(project cost, period cost)
16. Capture data by accounts group (Revenue, expenditure, capital, major repair etc) and separately show direct and indirect expenditure.
17. Separate overhead expenses of SBUs in various heads of expenditure and allocate to various projects under that SBU in proportion to the direct expenditure on the respective projects
18. Separate overhead expenses of Division in various heads of expenditure and allocate to all SBU under the division on a percentage basis.
19. Separate corporate expenses and prepare budget on the basis of normalized expenditure on the pre defined percentage basis.
20. Show separately abnormal expense/ costs.
21. Compute accommodation cost for Gurgaon office & scope complex office on the basis of pre defined rate.
22. Calculate and compare budget vs. actual in amount variance and percentage variance.
23. Allow preparation of budget cost center wise and profit center wise.

24. Document any changes made and reasons of amendments within each version of budget.
25. Update the original budget by increasing/reducing/transferring the budget amounts
26. Control the changes in budget, by accounting date of change and user ID after approval.
27. Classify revenue and expenditure items by means of a hierarchy.
28. Identify revenue and expenditure as controllable and uncontrollable for budget control.
29. Allow posting into a GL account only after approval of budget.
30. Keep budget information in more than one version(At least 5 versions)
31. Copy budget values of a new budget from a reference budget i.e. previous year/ prior period budget.
32. Check and highlight missing, incomplete budget items prior to consolidation.
33. Support both project/ non project capital expenditure budget
34. Provide for User-defined budgeting period, e.g., monthly, quarterly, annually or 3 year.
35. Allow distribution of final budget online by e-mail.
36. Transfer budget between Projects/ project offices.
37. Perform automatic budget availability checks during transaction posting.
38. Define tolerance limits either as a percentage or absolute value and automatically trigger, warning to user, mail to budget owner and disallow posting in case of excess budget.

Reports

1. Generate annual approval budget report in report form, graphs or charts.
2. Generate report of Comparison of actual against budget figures period wise.
3. Variance analysis (Actual/ Budget) reports for account wise, activity wise, accounts balance, financial report, periods within the same year and previous year, type of clients, revenue.
4. Exception reports for areas (e.g. unit, station) that exceeded budget with details.
5. Automatically check and report abnormal data i.e. actual exceed budget more than 10% or less than 10%.
6. Over/under budget reports.
7. Consolidated actual and budget for balance sheet, profit/ loss account.

Query System

Requirements- System should be able to provide the following features:

1. Generate different kinds of reports as per the user requirements from the vouchers punched on the basis of keywords and periods etc.

Audit trail

Requirements- System should be able to provide the following features:

1. Reports of any exceptional changes made by users like user, date for transaction, changes made to any voucher/ master data/ GL/ authorization.
2. Audit trail for re opening closed years.

Project Accounting & Costing

Requirements- System should be able to provide the following features:

1. Linking of project master data with project management module.
2. Preparation of project estimates
3. Perform project accounting on regional basis e.g. Corporate Office, Project Offices, Inspection Offices, Site Offices etc.
4. Define Project Accounting rules to book revenues and costs incurred.
5. Receive all documents (Bills and supporting documents) from projects along with the Running Account Bills through electronic mode.
6. Automatic deduction of liquidated damages/penalty from bills of contractor if work extends to beyond scheduled time.
7. Automatic transfer to WIP if physical work progress is less than 15 % of total contract/project and reversal in the next financial year
8. Support payments in accordance with project estimates and allow for revision in the sanctioned estimates
9. Able to make concurrence of statements of projects purchase, work contracts and make online approval for concurrence.
10. Allow for splitting of an expense item across multiple projects.
11. Integrate project management with the General Ledger, Accounts Payable, asset accounting, Inventory Management, Budget Controlling, Payroll Accounting
12. Support valuation of inventory.
13. Compute and allocate man power recording, accounting and variance analysis etc
14. Support overhead accounting, allocation, absorption etc and provide facility to edit/reverse allocations
15. Allocate actual or budget amount based on percentage, Level of activity or statistical information (e.g. floor area, number of employees etc.)
16. Compute % of completion, value of work done/built up cost & monitor project progress by viewing % of completion
17. Construction Accounting
    - Define type of turnkey contract(fixed rate or cost plus)
    - Support preparation of BOQ for construction contracts.
    - Support accounting for material and services
18. Revise cost estimates recording the reasons for the change.
19. Calculate statistical/financial ratios for project monitoring.
20. After project is finished, system should be able to settle costs and expenses incurred in project to fixed asset, WIP or expenses by percentage, prorate or actual amount
21. On final closure, able to check if the following certificates are available with the bill:
    - Final completion certificate
    - Handing over / taking over certificate duly signed by the contractor and Engineer in Charge.
    - Un-conditional no claim certificate from the Contractor.
    - Amount of the bill is within the estimate/budget.

22. Automatically transfer to fixed asset in asset accounting module, after project is complete.
23. After closing project, prohibit to post transactions in closed project
24. Ability to reopen closed projects.

Reports

1. Report of project account, project wise contractors' ledger, Project MIS report, Security ledger, statutory compliance, Bill tracking, Works tax register etc.
2. Report on value of inventory in hand on FIFO basis.
3. Customized reports by using tools for defining report layout and type of graphical representation.
4. Report on monthly concurrence statement
5. Reports of financial ratios and analysis in graphical form.
6. Report of comparison of actual data with budget data based on period/project etc.
7. Generate estimated & actual income and expense statement, profit statement, cash flow by profit center/ service/ customer & by user defined period.
8. Generate Project wise performance report of each SBU.

Project Client Accounting

Requirements- System should be able to provide the following features:

1. Able to maintain client funds accounts, Project wise vendors' ledger, Project MIS report, Security ledger, statutory compliance, Bill tracking,
2. Able to make reconciliation between client funds and bank account,
3. Keeps track of statutory compliance details like Service tax, Works tax etc.
4. Able to book only RITES fee as revenue and other receipts as deposit form client.
5. Integrate with project management.

Reports

1. Report of client project account, project wise contractors' ledger, Project MIS report, Security ledger, statutory compliance, Bill tracking, Reconciliation between client funds and bank account, Works tax register etc.

Export and lease business segment

Requirements- System should be able to provide the following features:

1. Integrate with project management.
2. Define type of contract as FOB or CIF.
3. Support Procurement of material, Store Accounting, Export sales, Lease accounting, Excise duty compliances(Excise bonds etc), Sales tax/VAT compliance, Shipments, Insurance, Bank guarantee, Letter of credit etc
4. Prompt for LC to be closed in case of project completion
5. Support inventory valuation.

6. Automatic billing based on Date of bill of lading (FOB contract,) or goods shipped date (CIF contract) considering the tax liability to RITES or client.
7. Support uploading of documents(Bill of lading etc) required for raising invoice and allow invoicing only after all relevant documents are uploaded
8. Support export incentives like SFIS, FMS

Reports

1. MIS report based on business segment, country wise, client wise, sector wise.
2. Inventory showing purchase, sold and stock in ware house.
3. Report on inventory valuation based on FIFO method.
4. Reports on exports made and excise benefits claimed against them.
5. Reports on duty drawback claimed, pending.
6. Report on lease rentals received and pending.
7. Generation of sales tax registers, excise bonds reports etc.
8. Generate list of advance license received, redeemed and balance.

Inspection office accounting

Requirements- System should be able to provide the following features:

1. Integrate with project management.
2. Link revenue accounting with test/ inspection certificate issued by units/inspection office
3. Cluster wise accounts maintenance such as railways, private, foreign etc.
4. Automatic billing based on inspection certificate issued considering the tax liability to RITES or client.
5. Support uploading of documents(Call letters, PO, inspection certificate, lb report etc) required for raising invoice and allow invoicing only after all relevant documents are uploaded
6. Automatic numbering of inspection certificate, lab reports etc.

Reports

1. Client wise Inspection report, inspection certificate.
2. Customized MIS report for management
3. Report of pending billing/ payments in case inspection certificate has been issued.

Internal audit

Requirements- System should be able to provide the following features:

1. Capture audit plan.
2. Perform compliance of guidelines and procedures
3. Capture online compliance by units and projects.
4. Record and tracking of audit objectives and corrective actions taken.
5. Able to support audit requirements as per Comptroller and Auditor General of India.

Reports

1. Reports for management and audit committee
2. Report for internal audit, its compliance and action taken.
3. Report for non compliance of audit actions.

Miscellaneous Receipts

Requirements- System should be able to provide the following features:

1. **Guest House receipts** :
   - Maintain the details of the cash received at the guest house.
   - Generation of the cash receipt for the amount received.
   - Automatically forwarding of the details to the Finance department
2. **Tender form sale receipts**
   - Record of details of the tender forms sold (sale price, tender no, name and address of the party etc.)
   - Automatic preparation of bank receipt voucher.

Project Progress report (MPR)

Requirements- System should be able to provide the following features:

1. Able to compile MIS of each SBU to generate MPR with details like projects secured (domestic & international), ongoing projects details, contracts secured, client feedback, projects completed during the year, offers submitted/pending etc.
2. At corporate level – MIS with details/reference to projects status in railway sector
3. Outstanding positions from each sector

Reports

1. Report of MIS at corporate level with details/reference to projects status in railway sector
2. Generation of MPR as per customized format.

MIS

Requirements- System should be able to provide the following features:

1. Capture data from all regional project offices, inspection offices, other site offices and various finance departments for preparing MIS.
2. Compile data received to prepare MIS in the desired format.
3. Consider man days allocation based on latest man month rates for MIS generation
4. Consider notional rents for ROC, Gurgaon and Scope office complex to be charged to respective SBUs/Divisions/Centres.
5. Able to send reminders to divisions/ departments and offices for sending the relevant reports.
6. Able to compute allocation of overhead on the basis of pre determined formula.
7. Integrate with Budget, financial data and project code directory.

Reports

1. Report on performance of each Division/ SBU, Business secured, Outstanding fees, retention money, EMD, TDS certificates, security deposits etc.
2. Generate MIS covering budgeted as well as actual turnover, expenditure, contribution, operating ratio, No. of days outstanding etc.
3. Generate outstanding report covering outstandings more than six months as on 31st March of the preceding year, amount realized, etc.
4. Separate outstanding report of disputed and undisputed amount, adjusted or written off.
5. Outstanding report showing percentage of reduction of total outstanding as on 30th September from previous year outstanding
6. Customized monthly/ quarterly and up to the month MIS reports for management review.
7. Reports on man days allocated to each project.
8. Report on income from miscellaneous resources.

2.3 Establishment (Payroll) Functions

1. Salary Calculation & records for regular, contract, Seconded employees & deputationist.
   - Maintenance of master data of employees and deputationists.
   - Pay Fixation on fresh recruitment of employees, promotion, deputation of employees and absorption of employees.
   - Calculation of salary, interest calculations, tax calculations, returns etc.
   - Arrear calculation shall support payroll increases with retrospective benefits
   - Preparation of salary for leave against pay.
2. Staff advances, recoveries and other deductions.
3. DA arrears.
4. Leave without pay (LWP), Half Pay Leave (HPL) computation.
5. Income Tax on salary.
6. Calculation of Foreign Service Contribution and payments.
7. PF Function.
8. Staff welfare like Health scheme –executive checks, children education, tea/coffee.
9. Terminal benefits like Gratuity, leave, GSLI computation and payment.
10. Group Insurance scheme, gratuity deposit and claims from LIC.
11. FSC Payment for employees on deputation.
12. Company Lease and Self Lease Payment.
13. Arrears calculation of salary.
14. Thrift society membership and subscription details.
15. Other staff payments
    - Medical, conveyance, awards, Ex-gratia, performance incentives, TA DA, transfer grant/allowance, leave encashment, professional tax.
    - Satisfactory performance – contract employees.
16. Corporate services
    - Rent, Electricity, water, property taxes, guest house maintenance, office and residential building maintenance, vehicles hire and maintenance, plant and machinery maintenance, software, consumables such as stationery, telephone office equipment and maintenance.
    - Capital assets – building, land, equipment, IT hardware, software

2.4 Requirements and Reports for Establishment (Payroll) Functions

Payroll Accounting Salary

Requirements- System should be able to provide the following features:

1. Capture master data, employee wage details from HR module for employee details and record bank details etc.
2. Classify the wage structure for CDA/IDA/Seconded employees and contractual staff.
3. Maintain codes for allowances and deductions with facilities to add edit and delete.
4. Automatic computation of certain allowances (DA, HRA etc) on the basis of pre-defined formulae's.
5. Automatic computation of recurring allowances, deductions, PF, perks (furniture, car house, etc), special allowance, conveyance allowance etc.
6. Support switchover from CDA to IDA scale
7. Compute gross pay, deductions and net pay for each employee.
8. Capture promotion (pay fixation), deferment option, increment, up gradation, transfer, status change, pay pattern change, and leave encashment details directly from the HR module.
9. Prorate salary and allowance payment based on employee hire or resignation date.
10. Provision to automatically increment the salary of employees on due date based on % basis and fixed amount.
11. Provision to withhold salary for employee under suspension, resigned and linkage of salary with punishments.
12. Provision for security control features, edit and validation rules for all input, update and delete transactions and audit trails for all critical changes of payroll transactions
13. Electronic reconciliation of control accounts found in Payroll and General Ledger system.
14. Prepare payroll and bank transfer statements for ECS, to be accompanied by a checklist
15. Capture information on loan details, release and refund of loan installment and deduct monthly installment from payroll for loan.
16. **Loans and Advances**
    - Automatically check eligibility and other conditions for any staff advance before processing payment to the employee.
    - Computation and recovery of interest on loans and advances.
    - Provision to recover advances with a single transaction.
    - Support direct deposits from employees.
    - Automatic calculation of insurance amount for HBA and its recovery from salary.
    - Automatic generation of the hypothecation report on completion of the full payment of the loan and be sent to HR for further action.
17. Automatic capturing of Refundable PF Advance details, LIC details.
18. Handle deductions for provident fund, GSLI, thrift and credit society, professional tax, Advances to staff for vehicle, HBA, festival, computer, VPF etc. and its recovery.
19. Provision to calculate deductions (Basic, DA and other allowances) proportionately for the period the employee was on LWP/HPL, and merges the same with monthly salary.

20. Allow prompt to prohibit any further staff advance till the earlier advance is adjusted or settled.
21. Provision to make deductions effective in the current/selected period.
22. Provision to make reverse deductions if any incorrectly withheld.
23. Ability to prompt by system when employee status changes to leave/absence.
24. Ability to transfer attendance details to salary from HR.
25. Upload/download data from external system, eg Excel, Access into application system.
26. Automatically calculate the recovery for benevolent fund,
27. Maintain history of Payroll transactions for a predetermined number of years.
28. Automatic deduction of thrift society contribution amount for member's loan recovery and loan inertest in case of loan from thrift.
29. **Income Tax**
    - Ability to incorporate and change income tax structure (income tax slabs, limits) as per Government of India rules.
    - System should calculate HRA rebate, medical exemption, and gratuity, leave encashment exemption, etc as per income tax rules.
    - Online filling of investment declaration form by employees.
    - Provision to capture TDS details post income tax processing in salary.
    - Calculate projected salary and TDS based on the YTD remuneration of the employee.
    - Handle exemption and rebates as per the income tax rules.
    - Facilitate auto generation of e-return of the Income tax act,
    - Recalculation of tax liability in case of retrospective change in salary after considering provisions of section 89 of Income Tax Act
30. Support calculation and payment of DA and Pay Arrear.
31. Calculate full and final settlement payment upon clearance from HR.
32. Trap the remittance details of employees on deputation and generates payment list unit-wise / employee wise as required.
33. **Foreign Service Contribution**
    - Provision to calculate and pay FSC charges for the employees, on deputation to RITES on a quarterly basis & able to capture leave period automatically from HR.
    - Provision for uploading of last pay certificate, office order, details of leave etc for release for FSC.
34. Ability to pay salary in multiple currencies, in parts and in multiple banks.
35. Automatically compute Performance Related Pay, bonus, ex- gratia, etc based on formula defined & appraisal rating from HR module.
36. Support Pay, process, bank statement generation, and voucher for miscellaneous staff reimbursement.
37. Maintain approved limits for expense reimbursements as per the hierarchy.
38. Compute full and final settlement payments on retirement/resignation/termination **(**Gratuity, leaves, etc)
39. Support Group insurance scheme, gratuity deposit & claims from LIC etc.
40. Support payment of annual premium to LIC at the beginning of the year.
41. Calculation of pay based on compensation (provision for gratuity, provision for leave encashment, etc) based on year of service, grade, leave details etc.

42. Allow multiple payrolls with different payroll administrator and combining payroll.
43. System should have data upload facility to upload history payroll data.
44. Support payroll processing on daily/weekly/fortnightly/monthly basis and employee wise also.
45. Support supplementary salary processing
46. System should have linkage to leave, promotion, location, qualifications etc.

Reports

1. Standard and user-defined reports for management reporting
2. Exceptional reports, pay summary, memorandum of difference, pay checklists, negative salary, negative tax, as per requirements to check for discrepancies or inconsistencies.
3. Generation of pay slips (Hindi/English) according to e.g. department, location, station etc
4. Automatic emailing of salary slips and SMS alert (as per RITES format) to employees (regular/contractual/foreign salary/consultants/adhoc) and Export of salary slip in desired format.
5. Generation of bank statement for payments – summary and bank wise.
6. Monthly statements for House Rent Recovery Deduction (Co-lease, Self Lease, Company Owned etc), Professional tax – state wise , income tax, PF deduction , thrift society recovery, etc
7. Report on SSG deducted/paid in case of contract employees.
8. Get exceptional statement for those employees whose contract period have been expired last month and not extended.
9. Get the SBU-wise number of staff at the end of last month, Addition during the month, left due to completion of period / project/death/termination/other reason and total number at the end of the month and check it with SBU.
10. Adhoc payroll reports, user defined, selective report, payroll register etc.
11. List of employees due for increment in the current month.
12. Generate absence status information on earning statement.
13. Monthly transaction report.
14. Recovery Statement of officials on deputation indicating item wise break up and the name of the respective accounts office in whose favor the recovery is to be remitted.
15. List of employees promoted/ transferred/ repatriated/ resigned/ stop payment.
16. In case of transfer and on deputation to other organisation LPC showing the last pay, date of increment, outstanding loan and advance etc to be issued.
17. Report on employee wise / loan wise advances sanctioned, installment deducted, balances for advances.
18. Details of LIC recovered.
19. Income tax- Generate all necessary E-TDS data, tax forms at quarterly, yearly and on ad-hoc basis (form 16, form 12 BA, form 24 Q, form 27A etc).
20. Yearly/Quarterly/Monthly income tax statement for all employees.
21. Generate employee-wise, railway/govt dept wise remittance statement.
22. Generate annual/quarterly FSC statement employee wise.

23. Generate employee wise consolidated statement of all recoveries and FSC from the joining date to date of repatriation.
24. Generate unit wise FSC statement on annual/quarterly basis.
25. Cheque receipt report for employee in case of repayment of loan.
26. Report on employee wise Accrued Interest and Principal Recovery Report for various loans.
27. Generate letter to be sent to LIC for gratuity claim giving details of Name, Assurance No., reason for leaving service and date of leaving, Date of joining , Date of Birth , No. of Year, Last pay drawn, Gratuity amount paid , Salary on ARD (in case of death) and Calculation of Gratuity.
28. System should allow forfeiture of gratuity incase of dismissal etc.
29. Automatic generation of salary voucher.
30. Automatic generation of unit wise salary summary.
31. Employee should be able to view his salary slip, PF slip, income tax calculation sheet, employee details, dependant details, nominee details, leave details, retirement benefit details, asset details, Appraisal rating, grievance details, seniority details, staff position details etc through Employee Self Service Portal

PF and Pension Management

Requirements- System should be able to provide the following features:

1. Capture the details of PF trust (PF organization, trustee details, PF Establishment Number, PF Jurisdiction, PF Bank details etc.)
2. Provision to capture annual PF interest rates.
3. Provision to capture nominee details (name, address, relationship, percentage, guardian information for minors) for payment of PF.
4. Automatically generate PF number of the employee on joining of new employee.
5. Automatically bifurcate Employer share of PF amount in 2 parts- one to be credited to employee ledger and other to be transferred to Pension account on the basis of pre defined formula.
6. Support online application for PF advance/withdrawal.
7. Facility to automatically transfer PF advance/withdrawal amount directly to individual bank account through ECS.
8. Intimate the non receipt of PF of any employee in RITES, or sent on secondment to other organisations.
9. Credit provident fund transferred from other organization to employee account upon their absorption in RITES.
10. Support inter unit reconciliation in case PF is deducted by zonal offices of RITES.
11. Provision to capture PF transfer in details, refundable, non refundable PF advance and final settlement details of PF.
12. Calculation of interest on the PF contribution on a yearly basis.
13. Automatic creation of JV and deduction from Employee PF ledger on release of PF advance and final settlement amount.
14. Should support calculation of PF fund to be transferred from units.
15. Support automatic interest calculation to generate closing balances.
16. Provision to carry forward closing balances of current to next year.
17. Should support automatic generation of PF challans.
18. Should support for investments-investments in specific sectors as per RPFC guidelines, comparison of investments and provide better investment option
19. Linking RPFC with PF and RPFC return

20. Support multiple pension schemes.
21. Support automatic monthly pension disbursement.
22. System should calculate pension/ family pension and payment.
23. System should automatically generate voucher on pension payment.
24. Calculation of income tax on pension payment.

Reports

1. Employee – wise PF Ledger Card, PF Loan card.
2. Generate pf no/ employee wise - opening / closing PF balance list, refundable /non-refundable PF advance sanctioned.
3. Report on Final settlements during a particular period.
4. Report on Advances given and charges recovered on the same.
5. Report on Contributions received from previous employer
6. Statutory monthly/ quarterly/ annually PF & Pension returns- 3EPS, 4EPS, 5EPS, 6EPS, 7EPS, 8EPS, 7IF EDLI, form 3A, and form 6A etc.
7. Report on opening and closing balance for refundable PF advance.
8. Report of sector wise investment register
9. Generation of investment letters, letter to banks
10. Generation of PF income and expenditure account, balance sheet.
11. Exception reports like employees having no transaction in their PF accounts during current year/ last 3 or 5 years.
12. PF monthly return.
13. Report of interest due on investments but not received.

Thrift Society

Requirements- System should be able to provide the following features:

1. Automatic generation of unique thrift society number on new application.
2. Automatic deduction of thrift society monthly contribution amount from salary.
3. Automatic deduction of thrift society loan installment amount along with interest from salary.
4. Accounting for thrift society- maintenance of employee ledger balance of employee contribution, loan details, loan ledger, loan interest details, loan settlement details.
5. Automatic transfer of balance to subsequent year on closure of accounts.
6. Online form for application of thrift society membership and loans.
7. Automatic generation of voucher on account of receipt of contribution and loan amount and payment of loans and final settlement.

Reports

1. Employee – wise Ledger Card, Loan card.
2. Generate society no/ employee wise - opening / closing balance list, loan sanctioned.
3. Report on opening and closing balance for loans.
4. Generation of income and expenditure account, balance sheet.

Miscellaneous payments

Requirements- System should be able to provide the following features:

1. Automatic computation and payment of Company Lease and Self Lease through ECS and calculation of House rent recovery.
2. Calculate and make payment for Overtime, Medical, conveyance, awards, Ex-gratia, TA/ DA Education allowance, transfer grant/allowance, briefcase, entertainment, dress etc.
3. Enable employees to fill various claims through Employee Self Service
4. Allow an employee to track his claim status at every stage.
5. Provide facility for a work flow for processing of claim
6. Automatic communication by email/SMS to the employee at the passing or rejection of the claim.
7. Automatic linking of the claim processing with the employee master for dependent verification, entitlement, and limit.
8. Make payment for Health scheme (executive checks), washing, children education fee, tea/coffee /telephone Reimbursement etc.
9. Monthly / annual report on all medical reimbursement details for indoor, outdoor and special diseases every month.
10. Ability to verify medical documents.
11. **Third Party Payments -** Make payment for Rent, Telephone, Electricity, water, property taxes, guest house maintenance, office and residential building maintenance, vehicles hire and maintenance, plant and machinery maintenance, software, consumables such as stationery, office equipment maintenance etc..
12. Make payment for Capital assets – building, land, equipment, IT hardware, software.

Reports

1. Employee – wise Ledger Card, Loan card.
2. Generate society no/ employee wise - opening / closing balance list, loan sanctioned.
3. Report on opening and closing balance for loans.
4. Generation of income and expenditure account, balance sheet.

Others

Requirements- System should be able to provide the following features:

1. Provision to calculate the total gratuity for a particular employee at any point of time.

Chapter 3
Human Resource and Corporate Services

Human resources department in any organization is responsible for implementing strategies, policies, standards, systems, and processes related to the management of human resource and other related areas. Typically an HR function covers manpower planning, staff resourcing, organizational design, workforce analysis, personnel data management, learning management, compensation, rewards, benefits management, etc. A human resource management system is helpful in implementing these policies and functions. It consolidates employee' related information data to present a complete workflow of an organization which assists in reducing the workload and increase the efficiency of the HR department.

3.1 Functions of Human Resource Management

Policy Matters, Workflow and Manpower Planning

1. Coordination of Budget for P&A Division
2. Policy matters, circulars/guidelines issued from Department of Public Enterprise and Ministry of Railways and other government departments.
3. Standardise the manpower requirement for each type of function and integrate the manpower planning process with organisation's future growth.
4. Plan the manpower requirements for the organization and eliminate the gap between the Actual Strength vs Sanctioned Strength
5. Schedule of delegation of powers and implementation of various organizational schemes.
6. Information/ data management obtained/received from PSUs, Govt. Departments/Rlys.
7. Special pay allowance, designation / re-designation of staff.
8. Coordination of Parliament Questions.
9. Updation of Human Resource Manual.
10. Matter connected with welfare of staff/officers, Sports activities.
11. Implementation of Pay Commission recommendations /Performance Related Pay.
12. Issue relating to productivity linked incentive scheme.

Resourcing-Recruitment

1. Recruitment, Appointment of casual /adhoc/ contract employees /advisors/Campus /recruitees, Engagement on Re-employment and extension of their tenure.
2. Extension of services, regularization and revision of monthly remuneration of contract staff.
3. Shorlisting of candidates and sending offer letter.
4. Verification of Medical, Character and Antecedents of Direct recruitees.
5. Maintaining service files of employees.
6. Retrenchment /termination of Contract staff.

Personnel data management

1. Employee History.

Performance and appraisal

1. Performance Appraisal, Confidential Reports and Property Returns.
2. Review of service after 50 years as per company policy.

Promotions

1 Seniority list.

2 Selection, promotions, up-gradation and creation of posts of Executive /Non Executive cadre.

3 Job-re-structuring and deployment of staff.

Exit Management-Retirement/ Resignation/ Termination

1. Processing and settlement of dues of employees retiring /resigning from the Company.
2. Issues relating to pension, family pension, gratuity, PF, voluntary retirement scheme.

Time Management

1. Punctuality / regularity of staff.

Leave management

1. Maintenance of leave account, leave encashment.
2. Different type of leaves- Casual, Half Pay Leave, Earn Leave, Maternity, Paternity, Extra Ordinary Leave etc.

Deputation

1. Deputation of RITES personnel to other PSUs, Abroad/ Govt. Sectors.
2. Maintaining lien and formulation of rules for lien etc.
3. Matters pertaining to deputation, extension, absorption, secondment and repatriation of officers and staff.
4. Forwarding of applications to various other organizations.

LTC and Advances

1. Work pertaining to leave, LTC, Medical advances and distribution of invitation card.
2. House Building Allowance, conveyance advance and Festival advance and daughter's marriage advance etc to staff of RITES.
3. Special sanction of medical advance, scrutiny and processing of medical bills.

Welfare

1. Organising canteen for Corporate Office
2. Distribution and vending of coffee/tea to RITES staff in Corporate Office.
3. Formation of panels of govt./Railway Hospitals and liaison with them.
4. Arranging annual Executive medical check-ups for employees & Keeping first aid medicines
5. Coordination with Doctors visiting RITES offices and residential colonies.
6. Long service awards, annual award, Birthday cards/ Annual day gifts.
7. Arranging Farewell / Memento to staff.
8. Organizing Annual day functions/ Farewell.
9. Staff communication, meetings and follow-up actions.
10. Benevolent scheme.
11. Observance of National days.
12. Incentives for family planning.

13. Providing relief to employees under distress.

D&AR

1. Sustain discipline in the organization and action against indiscipline.
2. Issues relating to Conduct, Discipline and Appeal Rules.
3. Staff grievances, grievances settlement and follow-up action

Learning management - Training and Membership of institution

1. Organizing training – in-house and outside RITES.
2. Training budget maintenance
3. Record of Training calendar
4. Request for nomination of employees.
5. Liasoning with Institutes and Billing
6. Feedback from the employees post completion of training.
7. Membership of professional institutions, payment of fees, policy etc. and incentives for higher qualifications.

Miscellaneous Activities

1. Issue of NOC for out-side employment and passport
2. Work pertaining to ISO, HR Plan, Corporate Plan, Labour Laws and other miscellaneous matters.

3.2 Requirements and Reports for Human Resource Management

Policy Matters, Workflow and Manpower Planning

Requirements- System should be able to provide the following features:

1. System should company information like company registration no, registration details, legal entity, legal name, PAN No, TAN no, Circle/Ward/Range, Income tax challan details.
2. Upload documents received from PSUs, Govt. Departments/Railways and policy changes of other PSUs companies/ DPE circulars/ Central Government Circulars which will be a tool in framing personnel policies of the Company.
3. Produce and update organization chart by functions, location and departments.
4. Capability to create various business groups, departments, positions in the organizations.
5. Assign job description to various positions.
6. Workflow to approve and reject changes.
7. View and store Human Resource Manual/circulars of RITES Ltd.
8. System should make possible to compare bench marking or any yard stick to create post
9. System should prompt alert prior to any position falling vacant in case of retirement/termination/ term of contractual staff getting over.
10. Capability to project cadre wise/grade-wise manpower requirements for a specified period based on data relating to resignations/ dismissals/future retirement etc.
11. Prompt alert when a position falls vacant due to retirement/term of temporary or contractual employee getting over.
12. Link the requirements with the roster points.

13. Define workflows and track the position of workflow where it is pending.
14. Capability to route the item to the authority and automatically re-route to alternate authority in absence of initial authority after a defined period.
15. Define administrative powers and delegation of powers position wise.
16. Enable multiple supervisor/ assignments to an employee.
17. Automatically updation of organization chart on transfer/ change of department.
18. Identify each job position by a unique position number.
19. Automatic planning of manpower based on yearly revenue budget on the basis of user-defined rules.
20. Integration of Manpower planning with cost center and other level of budgeting.
21. Match an employee with a job position.
22. Maintain staff career path and identify potential candidates for certain key positions.
23. Perform a needs analysis and manpower forecast for the corporation
24. Maintain cadre wise sanctioned count of employees.
25. Ability to create and save custom reports.
26. Reflect revisions/ modifications or clarifications in HRD Manuals issued by different Sections of HR Department i.e Promotion Group, Establishment Group, Recruitment Group, HRD group, Administration & Welfare Group, Estate etc.
27. Update the HRD manual on regular basis and be assessable to all employees of the Company.

Reports

1. Generate tree structure giving details of all role holders and reporting employees (defining reporting and reviewing relationships)
2. Monthly statement of staff position.
3. Staff Sanctioned list- cadre wise, cluster wise
4. Cadre wise/grade-wise projection of manpower requirements for a specified period based on data relating to resignations/ dismissals/future retirement etc.
5. Visibility of the positions along with the job description.
6. Region-wise/Level-wise/Discipline-wise/Category-wise/Job Description-wise/Location-wise/Department-wise or any other combination wise list of positions/ jobs lying vacant.
7. List of employees who are superannuating / separating from organization.
8. Report on employees cost vis-à-vis employee cost turnover ratio.
9. Details of the vacancy position (Discipline-wise/ Job Description-wise/Region-wise/Level-wise/ /Category-wise/ /Location-wise/Department-wise or any other combination as stated above in matrix/summary form and also provide employees list based on the option selected).
10. Generate date-wise/ topic wise all the personnel policies Circulars issued till date in chorological order.
11. Display major highlights/ news clippings of the Company/ latest updates of

Recruitment

Requirements- System should be able to provide the following features:

1. Capture and monitor the position vacated due to resignation/retirement/new job profile.
2. Ability to maintain roster register.
3. Ability to define recruitment plan and implementation schedule.
4. Provide support for departmental Requisitions / indents for openings and Vacancies.
5. Receive the eligibility criteria from the user.
6. Permit user to choose selection process/processes for different posts e.g. combination of Written Test and GD/PI, only PI, written tests etc.
7. Maintain database of all applicants and recognize repetitions, re-applications etc.
8. Applicant details should cover - Details of the present/permanent address, employment history, qualification, personnel history, upload resume, Examination score and interview score.
9. Capture the details of the applicant through internet for easy storage and retrieval.
10. System should cover processes like vacancy assessment, Notification of vacancies, Applications received, application screening and shortlisting, generation and mailing of call letters, panel formation, selection process- organizing and conducting interviews, Verification of originals, conduction of medical test for the employee, sending offer of appointment etc
11. System should give alert at the time of declaration of results for displaying notice, sending SMS and email.
12. Maintain a database of the interview committee members
13. As part of the selection process the system should have the provision for maintain various types of tests, question/answer database of each type of test (functional, psychometric, analytical etc.).
14. Facilitate admin scrutiny and functional scrutiny and maintain database for reasons of rejection, acceptance etc.
15. Automatically shortlist a candidate for vacant position by matching in the areas of best fit
16. Maintain a check list, store and view scanned documents in the system e.g. job applications, certificates etc.
17. Online applicant tracking - status of the applicant and the application processing, with the ability to set off reminders for closing dates, the next course of action to be taken.
18. Communicate result of pre employment medical examination to the candidates.
19. Track cost associated with recruitment i.e. advertising, agency fees etc
20. Support eligibility criteria for all grades for recruitment as per roster (reservation norms of govt. of India).
21. Enable career planning for individual and succession planning for the position.
22. Find gaps and identify training requirements.
23. Provision to transfer applicant data to personnel data when he/she is hired.
24. Calculate unfilled, shortfall and backlog vacancies at the end of each recruitment process.
25. Interface with Finance Dept and provide the details of Budget sanctioned and expenditure incurred during the recruitment.
26. Issue joining orders.
27. Provision for engaging consultants/advisors on contract basis.
28. **Roster management**

- Maintain separate post and discipline wise rosters for each group viz, A, B, C, D
- Maintain group wise PH and ex-servicemen roster and give a break up (Category Wise as well as PH) of the vacancies received.
- Provision for recasting and contracting the Rosters from time to time.
- Issue alerts and maintain an interface with the database for employees and identify positions vacant.

Reports

1. Generate a list of internal candidates suitable for a new or existing position.
2. Candidate profiles. E.g. Qualification-wise, Age-wise, Academic Category –wise etc.
3. Generate call letter/ appointment letters/ regret letters/r offer for automatic emailing or manual posting.
4. List of employees recruited (Discipline wise/Division wise/Designation wise/Department wise/ scale wise/Location wise/Period wise).
5. Recruitment reports- no. of vacancies sanctioned, no of candidates selected, no of offers accepted/rejected, unfilled positions, backlogs etc (Year-wise/ Post-wise/ Level-wise/ Category-wise).

Personnel Data management

Requirements- System should be able to provide the following features:

1. Creation of personnel file / service book of employees.
2. Maintain service history.
3. Provide a login to new employee along with defined access rights.
4. Capture Personnel History data for employees of RITES (employee no, employee name , address, phone no, email, gender, marital status, designation , date of birth, date of joining, status (regular/contractual/trainee), PF number, PAN No, category, religion, blood group, etc).
5. Support generation of unique id to employee on appointment.
6. Capture data consisting of
   - Photograph and personnel information, family & dependents details.
   - Education qualification.
   - Previous employment data (designation, salary and deductions, PF Number, PF establishment code, LTC availed in previous & current block, leave encashment, gratuity, VRS, leave details, income tax paid, professional tax paid, etc) .
   - Employee benefits, training details, performance data, and award received.
   - Disciplinary action and Legal Disputes/Action.
   - Annual physical check up result.
   - LTC declaration form, annual property form, medical reimbursement form.
   - Police verification form, medical examination form – on appointment
7. Enable definition of employee's category wise / grade wise / designation wise.
8. Capture details of employee on deputation (leave salary contribution, pension, PF GSLI etc)

9. Enable compilation of employee numbers by grade function, role.
10. Generate confirmation, promotion, transfer letter etc. automatically.
11. Maintain employee compensation details
    a. Salary definition- Basic, DA, HRA and other allowances.
    b. Leave encashment, Provident Fund, medical reimbursement
    c. Loans and advances.
    d. Gratuity and super annuation benefits.
    e. Income tax
    f. Other benefits, etc.
12. Enable an employee to enter his profile details in the ERP system on appointment.
13. Processing of scale and non-scale increments.
14. Allow employees to update & view their personal details via intranet/internet.
15. Prevent users from viewing or changing other employees records or certain information contained in their own records
16. Integrate the personnel data to internal unit such as accounting.
17. Warn and monitor special date e.g. probation completion, promotion due, and resignation.
18. Maintain service file documents of all employees.
19. Maintain movable/Immovable assets owned by an employee.
20. Capability to date and time stamp all changes in the database.
21. Capability of retaining the data structure and format even after future updates.
22. Integration with finance and treasury system.
23. Request online request for staff quarters allocation.
24. **Employee Lease Management**
    - Trap the details of the company/ self lease taken by employees.
    - Maintain the details of the owner of the flat from whom the employee has taken accommodation.
    - Automatic integration with the accounts for the payment of monthly rents.
25. **Deputation Process**
    - Capture the details of employees who are on deputation to RITES/ or to deputation from RITES to other organisastion.
    - Generate reminders for repatriation at least 6 months in advance.
    - Record Leave salary contribution/ gratuity contribution/ insurance contribution/ PF contribution of officers on deputation.

Reports

1. Generate personnel details of employees, Roster register (Discipline wise/ Division wise/ Designation wise/Department wise/ scale wise/Location wise).
2. Qualification wise details of employees (professional/non professional).
3. Current staff summary detail (Regular, deputation, contract, consultant, re-employed).
4. List of staff appointed on contractual basis, resigned/ terminated within a period.

5. List of personnel file issued and dumped.
6. Joining details of an employee/ new employee
7. Seniority list
8. Report to be sent to external unit eg government like PF, LIC etc.

Promotions

Requirements- System should be able to provide the following features:

1. Match with manpower plan and automatically generate list of employees who have the potential for promotion by department/ division/ unit
2. Review of current and previous work experience.
3. Maintain seniority list of employees.
4. Draw a competency matrix and define the competencies /skills/roles/responsibilities required at each level/position for the purpose of promotion.
5. Inbuilt system to check the eligibility criteria of executives for promotion at each level.
6. Carry out the entire appraisal and promotion process through on-line preparation/printing of Appraisal Forms/ have inbuilt mechanism of KPA formulation at the beginning of the year, provide for mid year review and year end assessment and awarding of marks.
7. Automatic intimation to employees for written test/GD/ interview with complete schedule.
8. Declaration of results of test and GD
9. Intimation of Interview schedule to Departmental Promotion Committee board members.
10. Capture the details of the Departmental Promotion Committee and generate results.
11. Automatically link performance appraisal, D&AR and vigilance (clearance) with promotion.
12. Automatic triggering of administrative details (e.g. preparation or memorandum for approval, reports, letters of promotion, exit interviews etc.)
13. Auto Updation of individuals record on promotions
14. Pay fixation of staff on promotion.
15. Notify relevant Departmental Head of the new record via workflow or email/ intranet.
16. Auto updation of roster SC/ST/PH on promotion and resignation/retirement

Reports

1. List of employees due for promotion.
2. Designation wise /level wise promotion Reports.
3. Upload promotion list and print Promotion orders of candidates
4. List of employees promoted/upgraded (Discipline wise/Division wise/Designation wise/Department wise/ scale wise/Location wise/Period wise).
5. Generation of the evaluation sheet based on defined criteria,
6. Different reports giving the details on the Drop out, Absconding persons, Unauthorized absence Appraisal rating wise report, study leave .
7. Different reports giving the details on the vigilance case, Disciplinary proceeding against employees.

Transfer

Requirements- System should be able to provide the following features:

1. Identify job vacancies or need for the transfer purposes
2. Maintain complete history of employee transfers since recruitment.
3. Record and capture all transfers whether it is management or employee initiated
4. Provision to record the transfer orders cancelled/ deferred/ modified.
5. Capture, record and monitor employee transfers by Department, Region etc
6. Track and report current position and transferable position by department/ division/ unit
7. Notify relevant department heads via workflow or email/ intranet.
8. Maintain the complete history of the employee transfer since his/ her recruitment.
9. Ability to do assessment of vacancies and preparation of transfer list to be linked basing on the user defined criteria.
10. Provide proposal on job rotation of employees depending on their skill as per employee master data.
11. Update the relieving status and joining status and generate relieving letters and joining orders on Joining.

Reports

1. Generate necessary letters e.g. transfer letter, benefits letter etc.
2. List of employees transferred within a period.

Exit Management-Retirement/ Resignation/ Termination

Requirements- System should be able to provide the following features:

1. Intimate the employees three month before retirement about their PF subscription/ PF, superannuation, leave encashment, loan, gratuity and pension claim forms etc.
2. Manage correspondence with the employees regarding clearing their dues before separation
3. Capture all resignations/Retirement/Termination details (notice period, leave encashment information, retrenchment compensation, voluntary retirement, commuted pension, PF settlement details, loan recovery, gratuity, superannuation etc)
4. Computation and processing of full and final settlement of dues along with income tax liability for the employees retiring /resigning from the Company, eg pension, family pension, gratuity, leave encashment , VRS and PF etc
5. Automatic online issue of NOC by HR to relevant departments and its submission by them to HR.
6. Notify relevant department heads via workflow or email/ intranet
7. Withhold payment of salary and other benefits depending on the conditions of resignation e.g. tax clearance, return of corporate property.
8. Prorate the payment of salary and other allowances based on the resignation date
9. Trap the details of exit review and forward it responsible manager.
10. Facilitate for issuance appreciation letter to Superannuated Employees.
11. Record reasons for the exit of employees due to resignation/termination etc.

Reports

1. Generate necessary letters e.g. resignation acceptance letter, etc
2. Generate list of employees who are either due to or already terminated/resigned/retired.
3. Issue of service certificate & list of employees issued to whom service certificate has been issued.
4. Gratuity/PF data of Resigned/Superannuated employees.

Performance Appraisal and Annual Property Return

Requirements- System should be able to provide the following features:

1. Categorize employees for which Annual Confidential Report is to be submitted.
2. Create performance appraisal template for different categories.
3. Assignment of the templates to employees.
4. Capture performance appraisal details of employees for evaluation & development needs.
5. Trap the managers' and additional appraisers comments
6. Provide a tracking system to know where the appraisal reports are pending for completion,
7. Generate reminders by email to employees who have not submitted the appraisal or Annual Property Return.
8. Generate reminders by email to appraiser who have not filled the appraise's appraisal.
9. Capture the Annual Property Return of employees.
10. Enable manager to recommend job change action (promotion/demotion etc)
11. Provide employee performance history.
12. Link the rating with the payment of performance related pay.
13. Identify the training needs during appraisal cycle.

Report

1. Generate personnel development plan for employees.
2. Generate rating wise list of performance evaluation of employees.
3. Generate department wise list of ACR received &
4. Generate reminders to SBU Head/ED/ Directors from whom ACR's have not been received.
5. Generate improvement letter.
6. Generate an appraisal summary report indicating all the appraisals done for all the employees over a period of time or an employee over a period of time.

Time Management

Requirements- System should be able to provide the following features:

1. Manage the work schedule of employees.
2. Capture employee time in and time out, attendance and absence.
3. Comparison with the planned working time and actual working time,

4. Definition of time calendar with provision to keep track of all public holidays including gazette and restricted holidays.
5. Automatically link absence/ time management with leave management system and payroll.

Reports

1. Attendance report for employees on daily /weekly/monthly basis.

Leave Management

Requirements- System should be able to provide the following features:

1. Maintain a coded table of all leave types and leave entitlements for employees.
2. Manage workflow based leave management including approval and rejection.
3. Capture, maintain, monitor all leave transactions/history based on user defined leave types(eg Earned Leave, Half Pay Leave, Commuted Leave, Casual Leave, Restricted Holiday, Maternity, Paternity, Extra Ordinary leave, study leave Quarantine Leave, Sick Leave, Special CL, Leave Without Pay etc.) from day one.
4. Enforce different applicable leave rules.
5. Automatic credit of leave through an accrual process in the system based on user defined criterion.
6. Maintain and integrate local holidays with leave management.
7. Facility for electronic application through ESS and approval/cancellation/authorization of leave via workflow.
8. Automatically warn and display message for employee's leave balance when their leave balance almost reach.
9. Automatic trigger for expiry of a particular leave
10. Capture data for leave encashment and its calculation.
11. Automatic transfer of leave details to affect the processing of payroll
12. Allow medical leave authorization on receipt of medical certificate.
13. Define the maximum number of balance to be carried forward to next year and leave balance to be carried over automatically to next year.
14. Capability to mark on-line attendance and link to swipe card/contact less card system.
15. Capability to intimate the controlling officer when an employee goes on unauthorized leave / extends leave/ returns in the middle of leave period.

Report

1. Employee wise Leave register (regular/contractual/deputationist).
2. Generate a list of employees who have excess of leave balance for the year
3. Division wise monthly and annual statement for leave, LWP and HPL availed.
4. Annual/Monthly statement of leave encashment availed by employees.
5. Consolidated statement of employee attendance to his manager.

Deputation

Requirements- System should be able to provide the following features:

1. Ability to maintain a list of employees on deputation to RITES and on deputation to other PSUs, Abroad/ Govt. Sectors.
2. Maintaining lien and formulation of rules for lien etc.

Report

1. Employee wise / Organization wise list of employees on deputation/ to deputation
2. List of applications received for forwarding to various organizations

LTC, loans, advances and gifts

Requirements- System should be able to provide the following features:

1. Trap LTC home town/ dependants details of employees.
2. Define loans and its characteristics i.e periodicity, interest rate, ceiling details, etc.
3. Attach loan sanctioning rules to every loan type.
4. Define the limits of advances.
5. Support electronic application for LTC application, HBA, PF advance and other staff advances (vehicle, computer, inverter, festival etc) and uploading of related documents.
6. Support on-line LTC encashment, sanction, LTC advance, cancellation, extension, postponements.
7. Support sanction of advances.
8. Support sanction of incentives for family planning.

Report

1. Generation of sanction letter for advances
2. Employee wise list giving details of LTC sanctioned for different blocks.
3. Generation of reminder through e-mail/SMS if LTC final bills are not submitted within the prescribed time.

Welfare

Requirements- System should be able to provide the following features:

1. Keep a list of panel hospitals for annual checkup and hospitalization.
2. Capture the details of annual medical check-ups arranged for employees.
3. Support an online request from departments for coffee/tea to RITES staff
4. Issue identity cards and access cards to employees.
5. Sanction incentives for higher qualifications

Report

1. Department wise list for distribution of Birthday cards/ Gifts/ Annual day gifts
2. List of employees due for long service awards (10,20,30 years)
3. List of details of employee to whom Independence Day card is to be issued.
4. List of Identity cards issued/ cancelled.

D&AR

Requirements- System should be able to provide the following features:

1. Handle Interpretation of conduct, disciplinary and appeal rules.
2. Ability to process and record proceeding of disciplinary cases as per RITES rule covering (Initiation, Explanation submitted, and Issuing of Charge-sheet, Enquiry, Suspension, Appeal, and Revision, Waiting at different stages).
3. Categorise a case (pending, contemplated, and cleared) for use by other.
4. Process the disciplinary cases as per rule (type of charge-sheet that can be issued to the particular group of employee, grade, appeal time, time for review, Schedule of Power).
5. Automatic linking of D&AR with payroll, promotions, transfer and posting and enforce Cumulative/Non-Cumulative punishment of reduction of Basic pay, other allowances/benefits, on account of punishment from the date of service of order.
6. Restrict the access to information to authorized officials and report through audit trail.

Report

1. Employee-wise details of pending / settled/ contemplated, cleared disciplinary cases and penalties imposed.
2. Region-wise Name of employees eligible to be member of enquiry committee
3. Generate note sheet for approval of enquiry committee
4. Details on various norms/guidelines and circulars related to compensation and enquiry.

Learning management - Training and Membership of institution

Requirements- System should be able to provide the following features:

1. Facility of preparing Training Need Assessment (TNA) for different categories of employees to create a Training Plan using multiple tools e.g. competency management, performance management, succession planning, self nomination etc.
2. Support generation of reminder letters / mails / to the employees/ controlling officers in case of non-submission of TNA.
3. Support preparation of annual HRD Plan covering participant profile, training group size, fixing of region & location, programme director, programme coordinator, dates, availability of training infrastructure etc.
4. Identification of expert faculties (internal/external) , institutions(educational/ professional training agencies) and finalisation of session-wise module, modes of training delivery, circulation of advance reading material, if any, to the nominated participants before start of training.
5. Create training calendar with a view facility to all employees.
6. Allowing booking of training course and making nominations
7. Automatic matching of employee qualification with the position requirement and determination of training needs to meet the requirement.
8. Seek nominations from employees (self nomination through ESS) via HRD coordinator / controlling officer.
9. Prohibit training of employees already trained, allocation for two or more courses simultaneously for the same time.
10. Support monitoring of nominations for training.

11. Support capture of training details(course, cost, venue, participant, period etc)
12. Maintain training history of employees.
13. Maintain training budget and track various types of training expenses.
14. Capture individual staff training information and training courses available.
15. Generate approval note based on the inputs required for the approval of expenditure related to single or multiple training programmes.
16. Generate training letters/information through print, e-mail, SMS including features like on-line confirmation, cancellation and rescheduling of training programmes etc.
17. Execution of training.
18. Support uploading of training programme related reading material, final module, photographs etc. online.
19. Link data from performance appraisal, promotion and transfer for training course
20. Evaluation of training by maintaining feedback from the participants wrt course and instructor in training
21. Scan training documentation, instructor profile, feedback and employees' certificate.
22. Reserve/check training room on line
23. Compute faculty rate per hour/ day/ month
24. Warn attendance in training course via workflow, email, SMS before training date.
25. Maintain records of membership of professional institutions and payment of fees.
26. Prompt reminder for payment due date for membership.
27. Enable managers to review staff training history and approve training enrollments.
28. Updation of employee profile on completion of training profile.
29. Provide search facility for presentation/study material available online
30. Maintain the details of Summer/vocational trainees in the corporation and a repertoire of Summer Training Reports
31. Generate training letters/ certificates to the summer/ vocational trainees.

Report

1. Employee-wise Training Need Assessment Report
2. Generation of annual training calendar.
3. Generate training 'Training Need Analysis' and succession plan report.
4. Status of Training Need Analysis.
5. Generation of training evaluation/feedback form.
6. History of employee-wise trainings attended from beginning till date.
7. Details of programmes identified in TNA matching with number of employees strength & list of employees - Functional/Behavioural area-wise including sub-areas
8. Generate report on training cost by department, section, course, period-wise etc
9. Report on Programme-wise expenditure report for a particular period
10. Report on Budget availability and budget utilized report
11. Programme-wise feedback report, consolidated training effectiveness report.

12. Generate list of institutions for which RITES has taken membership.
13. Employee wise details of the membership of institution.
14. Monthly statement of the trainings received by SBU personnel to HRD.
15. Employee-wise/ level-wise/ cadre-wise/ reserve category-wise deputation/ nomination to foreign countries along with purpose, countries visited, duration etc.
16. Detailed report on the Summer Trainees – man-days, nos., discipline-wise during particular period
17. Report on HRD programmes available for stakeholders along with functional area, schedule, charges, venue etc. and report on Stakeholders trained – National /International
18. Details on presentation/study material available related to particular session/HRD programme.
19. Status report of data available related to nominations, attendance, module, study material, feedbacks programme-wise.
20. Report on Internal/external faculties, training agencies

Grievance Redressal

Requirements- System should be able to provide the following features:

1. Maintain the detail information for all kinds of grievances.
2. Communicate the grievances of internal customers in time with appropriate authority.
3. Trigger to the HR wing for online reply within time.

Others Activities

Requirements- System should be able to provide the following features:

1. Provision for applying and issuing NOC for Passport/VISA, NOC/Forwarding of Application for outside employment of Eligible employees.
2. Handle cases for higher studies like Permission for higher studies, Grant of incentive for higher studies, Permission for study leave, etc.
3. Process the Small family norms, Pay Fixation cases, case of Merit award for children, Internet connection Facility, etc.
4. Issue various certificates to the employees like Last Pay Certificate (LPC) on transfer/superannuation/resignation, Employer certificate, Proof of residence for various requirements, Proof of Employment, etc.
5. Circulate Board level posts within the organization and processing of the applications of eligible employees according to the HR policy.
6. Manage Special Recruitment drive for SC/ST/OBC and Persons with disabilities
7. **Internal Audit**
    - Maintain a list of internal auditors, Management Representative (MR), list of pending audits
    - Details of various audits conducted, observations and recommendations of auditors, action taken reports region-wise/location-wise.
    - List of Certificate awarded to RITES

Report

1. Automatic Generation of proposal for seeking approval, Vigilance clearance report of concerned employees, communication to concerned individual and Finance
2. Report on issue of NOC for Passport/VISA, NOC/forwarding of Application for outside employment of Eligible employees.
3. Employee-wise/Department-wise/ Region-Wise/ Date-wise reports related to higher studies and Study leave-.
4. Reports related to grant of incentive for higher studies to eligible employees.
5. Reports related to Circulation of Board level Posts.- List of board level posts, List of applicants, generation of proposal for forwarding of application to PESB/MOR., issuance of communication to the applicants, dispatch of latest vigilance clearance report of concerned employees to PESB/MOR.
6. Report associated to merit award for wards of employees, Small family norms, etc.

Employee Self Service

Requirements- System should be able to provide the following features:

1. Enable employees to enter/edit/view data related to personnel records (bank details, marital status, nomination, property return, investment details, and leave application details).
2. Enable employees to submit their joining report at the time of new induction, promotion, return from leave etc.
3. Enable online filling of various forms like LTC declaration, medical dependent declaration etc.
4. Enable employee to view his salary details, leave status, leave balance, asset date, lease data, medical and entertainment data.
5. Enables employee to process and view status of the bills (medical, travel reimbursement, overtime, miscellaneous reimbursements etc.
6. Enables employee to apply for advances online and view the pending status of adjustments made.
7. Enables employee to apply for staff quarters/ lease.
8. Capability to remind employee through email/SMS/self service regarding modification or requirement of additional data.
9. Capability to provide links to the important items hosted on intranet/ RITES website eg circulars/instructions/policy documents, etc.
10. Capability to on-line approval of bill payments, leaves, loans etc submitted by employees.
11. Enables on-line performance approval form, review and approval.
12. Enable ESS users to see Family details of Spouse, child, father, Mother, brother, sister etc. with the details like Start date, End date, Name, Date of Birth and Gender.
13. Make the grievance status available to employee through ESS.
14. Approve/ reject the same as managers and send employee confirmation for the changes made.

MIS

Report

1. Generate reports which work as an effective for decision making for top executive.
2. Generate staff-strength, unit wise, group wise, age-wise, qualification wise, location wise, gender wise, category wise, SBU-wise, scale wise, permanent/contract wise report.
3. Generate reports on user defined criterion with drill down facility.
4. Display data in text/tabular/graphical form.
5. Provide capability to automatic generate various pages/graphs of PIS Report.
6. Provide an analysis of expenditure pattern of various regions.
7. Generate quarterly and annual reports on office -wise Training, Medical expenditures, Overtime payments etc.

3.3 Function of Administration and Corporate Services

Corporate services cover services which are cost centric in nature. Certain services i.e procurement of machinery, equipment, security, AMC etc, are outsourced. Wherever this outsourcing is essential, it shall be governed by the tendering process for procurement /hiring given in Project Management. The process related to budget control, monitoring etc shall be governed by the finance module.

General Administration functions

Estate Division

1. **Facility management**- Maintenance of Civil and Electrical Works of RITES Building, selection of agencies for maintenance work including contract management, insurance of buildings
2. **Procurement**, Registration, AMC, insurance and stock entry –Assets, Equipments, Diaries, Calendars, Tea and coffee.(Photocopier at DGS&D rates, furniture from Godrej)
3. **Asset Management**
4. Hiring of Security Agency from DGR.
5. Hire purchase and lease agreements
6. Allotment of staff quarters to employees.
7. Leasing of accommodation for employees.

Travel Cell

1. Selection of panel of Hotels for official stay.
2. Domestic and foreign air ticket booking, Visa processing, etc.

Stationery cell

1. Estimation of annual stationery requirement and preparation of list of items along with the rates, issued throughout the year.
2. Call for tender for selection of three vendors.
3. Receipt of requisition from different departments and maintenance of requisition register.
4. Procurement and distribution of stationery item for ROC and offices in NCR.
5. Maintenance of stock register- details of items purchased and issued to.
6. Bills processing and maintenance of bill register.

Marketing and Client Services

1. Business planning, Strategy formulation and Business Development.
2. Represent RITES in Industry Forum.
3. Keep clients constantly updated on the Rites growing range of services.
4. Corporate Communication including press release, corporate film.
5. Co-ordination with Indian Chamber of Commerce and Export Promotion Council.
6. Management of Public Information System for implementation of RTI.
7. Co-ordination for handling of delegations and organizing client meet.
8. Co-ordination for technical assistance, feasibility studies and overseas assignments.

Corporate communication

1. Corporate Image Building, Printing of brochures and RITES newsletter
2. Information dissemination through RITES intranet, website etc
3. Organization of seminars, conferences and exhibitions.
4. Membership of different institutions

Marketing

1. Billing to client
2. Business opportunity scanning
3. Co-ordination with embassy.

Other activities

1. Preparation of country profiles.
2. Processing of sponsorship (Corporate and Business).
3. Internal quality audit of Quality Management System.

Publishing of RITES Journal

1. Publishing and distribution of journals ((half yearly).
2. Approaching people for articles and maintenance of Databank.
3. Maintenance of Portfolio of authors and clients for journal distribution.

Hindi Cell

1. Coordination of Hindi work, ensure proper compliance of the O.L. Act and O.L. Rules Monitoring / implementation of orders / instructions relating to correspondence in Hindi.
2. Observance of Hindi fortnight.

Legal Cell

1. Managing Court cases and hiring of lawyers for cases.

Vigilance

1. Review of service after 50 years etc. as per company policy.
2. Handle cases of vigilance enquiry.
3. Observance of vigilance awareness week.
4. Gives vigilance clearance for going out of country, promotion and application for PSU/ other government bodies.

Information Technology

1. Centralized procurement of IT Hardware and Software.
2. Provides In house IT services (IT hardware maintenance, Internet connection, and Email ID allocation).

3. RITES Website maintenance.
4. Maintenance of IT Hardware Stock Register.
5. Maintenance of Data Center (Servers, Network, Selection of AMC partners for Servers)

Signal and Telecom

1. Providing In-house telecom service.
2. Managing of Security and Access system
3. Visitor Gate Pass Management

Library

1. Procurement of Books, CDs, Cassettes and accession of books
2. Issue and Return of books
3. Physical verification of books
4. Maintenance of RITES files/ report (receipt and issue)

Dispatch

1. Dispatch
2. Speed post of documents

File Tracking

1. Tracks the movement of files/documents in the organization

Company Secretariat

1. Preparation of the Monthly Progress report (MPR) and submission to the Ministry.
2. Preparation and submission of MOU
3. BOD and Audit committee
4. Vetting of Agreements (Individual and Legal) and MOU.
5. Preparation of answers to questionnaire and Parliament Question

Corporate governance

Corporate Social Responsibility

1. Identification, approval, execution, compilation, information and reporting of projects on CSR
2. Allocation of funds for CSR projects.
3. Monitoring of progress of CSR projects

Corporate Reports

1. Submission of performance targets.
2. Finalization of the targets with corporate planning department in consultation with all the functional Directors & CMD
3. Submission of draft MOU to MOR, DPE and other ministries.
4. Preparation and final submission of MOU reports.

Right to Information

1. Provide replies to queries which come under the RTI Act 2005 as per stipulated provision of the act to the applicant.

3.4 Requirements and reports of Administration and Corporate Services

General Administration

Estate Division

Requirements- System should be able to provide the following features:

1. Maintain history of Civil and Electrical Works of RITES Building and equipments.
2. Tendering for selection of agencies for maintenance work, tea, security and procurement of New Year diaries and calendar.
3. Provide the details of the available agencies for different services.
4. Provide the alerts two months prior to expiry of Contract
5. Able to maintain list of contractors and their performance assessment
6. Should support online requisition for calendar, diaries etc from departments.
7. Online complaint system for maintenance of RITES office buildings, flats etc
8. Should support asset management (Procurement, Registration and stock entry).
9. Maintain list of DGS&D rates for procurement of photocopiers.
10. Able to manage AMC of equipments
11. Manage insurance and warranty of equipments, assets and buildings etc.
12. Get online request for guest house and book the same.

13 Employee Staff Quarters/ guest house Management

- Maintain a list of Nos. and type of dwelling units/ staff quarters/guest house of RITES.
- Display the position of the vacant/filled staff quarters.
- Receive online request for staff quarters allocation.
- Allocate staff quarters to employees.
- Receive an online request for need for maintenance of staff quarters.
- Enable employee to check the availability of required Guest house.
- Facility to employees to access and view the status of the bookings.
- Authorization to the manager to approve/modify/cancel the bookings and automatic alert to the concerned employee.
- System should enable different available booking as per entitlement
- Facility to notify the concern employee prior to booking date.

14 Lease Management

- Trap the details of the company/ self lease taken by employees.
- Maintain the details of the owner of the flat from whom the employee has taken accommodation.
- Maintain the payment history to the owners.
- Prompt an alert to the concerned employee and admin one month before the expiry of the contract.

15. Maintain a list of the different vehicle/ taxi hiring agencies of RITES.
16. Maintain the details of the vehicles hired by RITES including the name of the employee allotted to.
17. Maintain the details of the billing and expenditure against the vehicles hired.
18. Maintain the details of the parking pass allotted to the staff of RITES for parking its vehicles in RITES complex.

Report

1. Generate department wise list of distribution of diaries, calendars, tea and coffee.
2. Generate list of complaints registered/ attended and pending.
3. Generate list of assets and their physical location.
4. Generate report on type of RITES flats, guest houses and rental income from each category of flat and expense incurred on them.
5. Prompt alert on due date of AMC and insurance.
6. Generate Monthly/Yearly/Quarterly reports for booking status of Guest houses
7. Department wise periodic taxi booking report.
8. Generate a category wise list of vendors

Travel Management

Requirements- System should be able to provide the following features:

1. Maintain an online request for travel booking (date, destination, and purpose of the trip, the transportation and accommodations required, the requested advance and the estimated costs for the trip).
2. Format for filling the travel expense data.
3. Maintain details of Air ticket booking- domestic and foreign for officials.
4. Maintain details of visa processing.
5. Enable travel planning & post travel claims and can also be integrated with third party system for booking.
6. Posting of the travel expenses to financial accounting.

Report

1. Generate report on travel booking and travel expense.
2. Generate report on department wise, employee wise and country wise ticket booked
3. Generate report on visa processing.
4. Generate yearly/quarterly/monthly report on the billing and expenditure on the domestic and international booking.

Stationery cell

Requirements- System should be able to provide the following features:

1. Provide an estimate of requirement of the stationery.
2. Ability to tender for procurement of stationery.
3. Should support online requisition of items and automatic ordering to vendors.
4. Maintain stock details of items purchased and issued to.

Report

1. Statements showing the pending quarterly bills.
2. Generation of stock register, bill registers, and vendor wise orders issued/pending orders, department wise stationery requested/issued etc.

Marketing and Client Services

Requirements- System should be able to provide the following features:

1. Maintain a repository of press release and other media.
2. Manage the details of RTI request received.
3. Should have the provision to handle an online client feedback on service quality.
4. Maintain the details of the annual events conducted by RITES.
5. Maintain the details of the total expenditure incurred for a particular event.
6. Maintain the details and the total no. of agencies involved in a particular event.

Reports

1. Automatic alert prior to date of event
2. Generate a report on Cost incurred during the event
3. Monthly/quarterly/yearly reports on the RTI queries received and responded

Corporate communication

Requirements- System should be able to provide the following features:

1. Tender the printing of brochures.
2. Publish and circulate RITES newsletter via electronic means.
3. Maintain a list of membership and sponsorship of different institutions.
4. Trap the details of the complaints submitted by various people at RITES website

Marketing

Requirements- System should be able to provide the following features:

1. Maintain the billing to client.
2. Maintain the details of country profiles.
3. Keep the details of the sponsorship – (Corporate and Business).

Publishing department

Requirements- System should be able to provide the following features:

1. Maintain a distribution list of Journal in India and Abroad.
2. Maintain a databank of articles and Portfolio of authors.
3. Support maintaining a list of clients for journal distribution.

Reports

1. Generate a list of clients to whom journals were distributed.
2. Generate a list of articles and authors available (Subject wise, author wise, year wise).

Hindi Cell:

Requirements- System should be able to provide the following features:

1. Issue orders in Hindi.
2. Maintain records of Hindi workshops, roaster of employees regarding training in Hindi

Legal Cell

Requirements- System should be able to provide the following features:

1. Approval of Deeds/Documents relating to advances.
2. Keep track of court cases pertaining to the above said matters.
3. Track status of all legal cases and litigations with details like: Case details, status in terms of loss/win/pending, type of loss due to legal case, performance of advocates (loss/win/pending).

Report

1. Report on status of ongoing/existing court cases.

Vigilance

Requirements- System should be able to provide the following features:

1. Ensure compliance of the provision of Recruitment & Promotion rules.
    - Issue of NOC for out-side employment/ passport/Visa
    - Handle matters pertaining to vigilance cases.
    - Handle Interpretation of conduct, disciplinary and appeal rules.
    - Ability to maintain a repository of complaints lodged and their status.
2. Ability to process the disciplinary enquiries as per authorization and rule for Conducting disciplinary enquiry
3. Capture all the activities during the workflow with date and time stamp. Ability to maintain Status and repository of RTI's filed.
4. Trap the details of the complaints submitted by various people at RITES website

Report

1. List of employees against whom vigilance case is pending and detailed description of cases and the proceedings.
2. List of NOC issued.

Information Technology

Requirements- System should be able to provide the following features:

1. **IT Help Desk System**
    - Make online complaints for computer hardware, software and troubles.
    - Get an online request for internet connection and email.
    - Maintain the tracking of the internet connection provided to the employees.
2. Support tendering for computer hardware and software.

Report

1. Report on details of hardware and software procured.
2. Reports on status of complaints (attended/pending) – daily, monthly etc.
3. Report on list of request for internet connection and email.

Signal and Telecom

Requirements- System should be able to provide the following features:

1. Online request for telephone related complaints
2. Linking of security and access system with employee attendance in HR.
3. Support issue of visitors gate pass online and capturing of visitor's details & photographs.
4. Details of the mobile phones issued to the staff
5. Maintain and manage the telephone directory of staff of RITES.

Report

1. Generate report of complaint register for telephone complaints showing complaints registered, rectified and pending.
2. Daily Report of employee's entry and exit;
3. List of late comers and early goers, list of consistent late comers, etc.
4. Daily List showing entry & exit of visitors with their details

Library

Requirements- System should be able to provide the following features:

1. Capture books information subject wise, author-wise, publisher-wise, and edition-wise.
2. Search books based on the above mentioned criteria and also based on any keyword.
3. Make online request for issue of books.
4. Specify the issue of books with its issue date and due date of return.
5. Prompt alert on due date and a mail to user for return of books.
6. Automatic calculation of fine if books are returned after due date.
7. Maintain stock in any media like books, CD, cassettes, albums, maps etc.
8. Provide barcode of each book, CD etc.

Report

1. Generate report of books issued date wise, employee wise.
2. Generate report on stock register media wise (CD's, cassettes, albums, maps etc).
3. Generate report on barcode list.
4. Generate list of books subject wise, author wise, publisher wise, edition wise.
5. Generate physical verification report and its discrepancy.
6. Generate report on vendors/publishers and their history.

Dispatch

Requirements- System should be able to provide the following features:

1. Maintain internal and external Dak dispatch details of documents

Report

1. Generate report of Dispatch register
2. Generate date wise, department wise list of documents couriered.

File Tracking

Requirements- System should be able to provide the following features:

1. Automatic generation of diary no for new file.
2. Ability to Create Edit / Forward / Merge- Demerge/Close/ Receipt in a File/ document for diary maintenance.
3. Ability to forward a receipt to a particular section selected
4. Track the current location of the file/document.
5. Allows user to reserve files on specific dates.

Report

1. Report on handling and workflow history of each document or file.
2. Department wise list of files.
3. Details of the history of movement of files.
4. Report to view the List of Receipts in the department.

Company Secretariat

Requirements- System should be able to provide the following features:

1. Prepare Monthly Progress report (MPR) and MOU.
2. Statistical feedback.
3. Preparation of replies/ application to be filed in the labor courts, district court, High Court or Supreme Court.
4. Handle Corporate / Company Law matters.

Report

1. Generate corporate governance report, directors report as per companies act.
2. Generate Directors remuneration report.

Corporate Governance
Corporate Reports

Requirements- System should be able to provide the following features:

1. **MOU** - Capture data for the preparation of annual **MOU of RITES**. It should cover
    - **Static financial parameters**
        - Financial performance Indicators- Gross margin/ gross sales & Operating turnover/ number of employees
        - Financial Indicators size - Gross margin/ gross sales & financial returns.
    - **Dynamic parameters**
        - Sundry debtors
        - Implementation of corporate training plan.
        - Project implementation.
        - Reconciliation of accounts.

- **Sector specific**
  - Development of sponsorship
  - New orders secured.

2. Templates as per RITES format for accepting inputs for generation of the following reports in word/pdf / other formats to be submitted to DPE/ROC/MOR/BOD etc.
   - Report on details of board level vacancy and D&AR status (major, minor penalty imposed, new cases, and solved cases as per RITES format.
   - Report on MOU review on half yearly and quarterly basis.
   - Report on annual/half yearly survey to DPE.
   - Registrar of Companies- uploading of Form 32 and details of change of board level positions.
   - Format for filling the annual return to be submitted to Registrar of companies.
   - Report on the details of staff sent on secondment.
   - Report on the details of the expenses on foreign travel.
   - Quarterly reports on statutory compliance for personnel law, corporate law, Personnel law, laws related to income tax, foreign exchange etc.
   - Report on the details of contracts awarded on single tender basis,
   - Report on the details of new contracts awarded.
   - Report on the details of the investments made by RITES.
   - Report on the details of the pending legal/arbitration cases.
   - Report on the details of the JV's formed by RITES.
   - Report on the details of the policy matters.
   - Quarterly reports submitted by the Investment committee, Risk committee, Audit committee, remuneration committee
   - AGM – Report on the dividend declared and resolutions made.
3. Provide platform and templates for auto updation and of the performance data from different areas.
4. Provision to edit and generate the templates of all the mentioned reports as per required format.
5. Facility to seek information as per the prescribed format for all reports from various participants.
6. Facility to send auto reminders via SMS/email/ electronic media to various participants for non submission of the data/information.
7. Transmission of data to customers/ stake holders in electronic format.
8. Provision of electronic approval of documents internally within department before transmitting to next hierarchy outside in line of approval
9. Provide the facility to review, modify, and finalization of compiled data from various participants and departmentally as per the defined work flow process in the formats/Templates as per requirements of DPE/MoR.
10. Facility of forwarding the approved MoU and attachments to intended internal and external stake holders.

Reports

1. Generate MOU Booklet report as per RITES format and DPE guidelines.

Corporate Social Responsibility

Requirements- System should be able to provide the following features:

1. Provide selection of various CSR projects based on inputs.
2. Allocates funds for CSR projects
3. Monitor the progress and fund utilization of each of the CSR project.

Reports

1. Location wise list of CSR projects
2. Status of execution of CSR projects

Right to Information

Requirements- System should be able to provide the following features:

1. Provide a facility to register new RTI queries and generate a unique registration no.
2. Provide a facility to upload the RTI queries - scanned copies of documents received.
3. Facilitate emailing of the request to reply to the respondent.
4. Generate forwarding letter to all respondents PIO's/regional CPIOs/ in a standard format.
5. Generate the Acknowledgement receipt / Letter in the predefined template to the concerned including demand of additional payments for providing the information as per RTI Act 2005.
6. Generate letters in predefined formats asking for clarification and information from appellant.
7. Facility to view the processing status of case.
8. In case of non receipt of inputs from respondents at predefined time intervals the system should automatically send reminders/alerts to them by SMS / Pop Ups.
9. Facility for review, amendment and finalization of inputs and approvals as per schedule of power and forward the finalized reply to applicant with copy to all concerned..
10. Provide the register of documentation to get chronological information of the reply / appeal cases.
11. All replies, comments from all concerned including attachments should be linked to the registration number to get complete updated case history of the case.
12. Facility to search the database to get information about similar cases, individual, topic concerned on the user defined criterion.
13. Generate the Annual return as per RTI act for the Requests / Appeals entered in the RTI System.

Reports

1. Location wise RTI received
2. Status of RTI queries.

Chapter 4
Other Miscellaneous Requirements

Dashboard Features

Requirements- System should be able to provide the following features:

1. Monitor project performance as per the project parameters & generate dashboard visuals.
2. Monitor project stages and generate dashboard visuals.
3. Generate scorecards based on various business metrics for various projects and identify the risk and underperforming projects.
4. Performance dashboard for schedule and customizable dashboard for personal view.

RITES Website Integration Features

Requirements- System should be able to automatically integrate with the RITES website and provide the following features:

1. Publishing and automatic updation of tender (NIT/RFP) etc, its status as on date.
2. Publishing and automatic updation the status of the bills paid to the vendors.
3. Publishing and automatic updation of the recruitment vacancy notices and their results and status as on date.
4. Publishing and automatic updation of the periodical financial reports.
5. Publishing and automatic updation of the employee settlement details.
6. Publishing and automatic updation of the circulars released in RITES.
7. Publishing and automatic updation of the training calendar
8. Publishing and automatic updation of ISO Corporate manual of RITES and SBU ISO manuals.
9. Publishing and automatic updation of division wise current ongoing project of RITES

Data Modeling, Data Consolidation, Data Maintenance

Requirements- System should be able to provide the following features:

1. Ability to provide standard content – data models for employee master
2. Allow user defined data model and support import/export of models available as standard formats (XML, XSLT, WSDL, and BPEL, etc).
3. Ability to support modeling at conceptual logical and physical level.
4. Ability to support import of models designed in modeling tools.
5. Support data consolidation through various sources.

6. Ability to retain the mapping of the key information (i.e source system, source object and source key).
7. Ability to import the data in any format for consolidation i.e Open database connectivity(ODBC), XML, Excel Access, Oracle, Port, SQL Server, XML Schema
8. Ability to provide infinite and ability to handle any tabular source data.
9. Provide a consistent view of source data irrespective of source format.
10. Ability to provide full relational support and combine related information from multiple tables at the time of import.
11. Ability to support value conversion and mapping at the time of import of data.
12. Ability to support conditional filtering at the time of import.
13. Validate and match rules defined to cleanse the data.
14. Support workflows for incoming data to trigger data governance process.
15. Support check out, check in to ensure data consistency and rollback during consolidation.
16. Ability to set the base for subsequent master data harmonization.
17. Support data acquisition and automated consolidation as batch mode.
18. Support drill down search capability, search based on pick list ensuring all available values are visible to the user for search.
19. Provide attribute based, multi dimensional search to allow search selection across multiple dimension
20. Ability to search null values.
21. Ability to provide limited list values during search to limit the pick list on the basis of previous selection.
22. Ability to provide color coded field values at the time of multiple selection to detect errors in master data.
23. Provide automatic change detection for restructuring in repository.
24. Provide multilingual support and Unicode.
25. Provide change history tracking to ensure compliance.
26. Support objects like images, video, PDF, HTML, text blocks, binary objects etc and advance image management capabilities.
27. Provide role based access for restricted view of data and allow multiple users to enter different parts of records based no roles.
28. Define validation for data to ensure its correctness.
29. Ability to provide solutions which is platform independent and can be deployed on most of the data base.
30. Ability to provide solution which is operating system independent and supported on most of the available operating system.
31. Ability to connect to other systems in the distributed environment.
32. Ability to provide API to build web based applications and provide data to other applications, to update search and create data from custom applications.
33. Ability to provide data as a web service to other applications.
34. Support secure data formats and wire protocols like SSL.

35. Support Multi-tiered architecture which can be installed on different servers for logical and functional load sharing.
36. Support 24 X 7 availability.

List of Abbreviations for Functional Matrix

ACR	Annual Confidential Report
ADB	Asian Development Bank
AGM	Annual General Meeting
AMC	Annual Maintenance Contract
API	Application Programming Interface
BG	Bank Guarantee
BI	Business Intelligence
BOD	Board of Directors
BOC	Bid Opening Committee
BOM	Bill of Materials
BOQ	Bill of Quantity
BMS	Building management system
BRC	Bank Realisation Certificate
CIF	Cost Insurance Freight
C & M	Contracts & Materials
CC	Corporate Communication
CDA	Central Dearness allowance
CE	Cost Estimate
CL	Casual Leave
CP	Corporate Planning
CPG	Contract Performance Guarantee
CST	Central Sales Tax
CTC	Cost to Company
CVC	Central Vigilance Commission
CV	Curriculum Vitae
DA	Dearness Allowance/ Daily Allowance
D&AR	Disciplinary and Appeal Rule
DCB	Domestic Competitive Bidding
DGR	Directorate General Resettlement
DGS&D	Directorate General of Supplies & Disposals
DMS	Document Management System

DOP	Delegation of Power
DPC	Departmental Promotion Committee
DPE	Department of Public Enterprises
DPR	Detailed Project Report
EAI	Enterprise Application Interface
ECS	Electronic Clearance System
ED	Executive Director
EFT	Electronic Fund Transfer
EL	Earned Leave
EMD	Earnest Money Deposit
ERP	Enterprise Resource Planning
ESS	Employee Self Service
EOI	Expression of Interest
FAC	Final Acceptance Certificate
FD	Fixed Deposit
FIFO	First in First Out
FAQ	Frequently Asked Question
FOB	Free on Board
FM	Functionality Matrix
FMS	Focus Market Scheme
FR	Feasibility Report
FRS	Functional Requirement Specifications
FSC	Foreign Service Contribution
FTS	Fund Transfer Statement
GA	General Arrangement
GCB	Global Competitive Bidding
GIS	Geographical Information System
GoI	Government of India
GL	General Ledger
GRN	Goods Receive Note
GSLI	Group Saving Linked Insurance
HBA	House Building Advance
HOD	Head of Department

HR	Human Resources
HRA	House Rent Allowance
HRD	Human Resource Department
HRM	Human Resource Management
HPL	Half Pay Leave
IA	Internal Audit
IB	International Business
ICB	International Competitive Bidding
ICAO	International Civil Aviation Organization
IDA	Industrial Dearness Allowance
IFRS	International Financial Reporting System
IRR	Internal Rate of Return
ISO	International Standards Organization
IT	Information Technology
IWT	Inland Water Transport
IUFR	Interim Unaudited Financial Management Report
JV	Joint Venture
KM	Knowledge Management
KPI	Key Performance Indicator
KRA	Key Result Area
LC	Letter of Credit
LD	Liquidity Damage
LIB	Limited International Bidding
LIC	Life Insurance Corporation
LOA	Letter of Award
LPC	Last Pay Certificate
LT	Limited Tendering
LTC	Leave Travel Concession
LWP	Leave Without Pay
MB	Measurement Book
MIS	Management Information System
MOR	Ministry of Railway
MOU	Memorandum of Understanding

MPR	Monthly Progress Report
NCB	National Competitive Bidding
NCR	National Capital Region
NIT	Notice Inviting Tender
NOA	Notification of Award
NOC	No Objection Certificate
O & M	Operation and Maintenance
OEM	Original Equipment Manufacturer
OL	Official Language
OT	Open Tendering / Over Time
P&A	Personnel and Administration
P&C	Privatization and Concession
PAC	Project Authority Certificate
PAN	Permanent Account Number
PESB	Public Enterprises Selection Board
PF	Provident Fund
PIP	Project Implementation Plan
PO	Purchase Order
PPR	Payment Proposal Run
PR	Purchase Requisition
PSU	Public Sector Undertaking
QA	Quality Assurance
QP	Quality Plan
QPR	Quarterly Progress Report
QR	Qualifying Requirement
RDBMS	Relational Data Base Management System
RDSO	Rail Design Standard Organization
RE	Revised Estimate
RFP	Request for Proposal
RFQ	Request for Quotation
RM	Retention Money
ROC	Rites Office Complex
RPO	Regional Project Office

RPFC	Recognized Provident Fund Commissioner
RTGS	Real Time Gross Settlement
RTI	Right to Information
SBD	Standard Bidding Documents
SBU	Strategic Business Unit
SD	Security Deposit
SFIS	Served from India Scheme
SLA	Service Level Agreement
SOP	Schedule of Power
SOW	Scope of Work
SSG	Satisfactory Service Grant
ST	Single Tender
SMS	Short Messaging System
TA	Travelling Allowance
TAN	Tax Deduction Account No
TC	Tender Committee
TDS	Tax Deducted at Source
TEC	Tender Evaluation Committee
TM	Technical Member
TNA	Training Need Analysis
VAT	Value Added Tax
VPF	Voluntary Provident Fund
VRS	Voluntary Retirement Scheme
WB	World Bank
WIP	Work In Progress
WO	Work Order
YTD	Year to date

Appendix-II Details of Legacy Systems

Major functions of Personnel Department (HR) and the Finance Department have long been computerized and in operation since long. The online, multi user applications have been deployed to capture the data at source of generation. The applications also provide mandatory, MIS and control reports as per requirements of the users. The brief functional description and the platform of each of the existing applications are described below.

(i) **Personnel Information System (PIS):** The **online, multi user, menu driven** PIS covers functions like creation / updation of master employee information for new employees which includes family details, employment details, training details, qualification details etc. Further it captures all the events like promotion, posting, transfers, trainings, leave, retirement/ resignation etc pertaining to each employee. The system facilitates generation of large number of statutory and MIS reports. The application has been developed using .NET as front end and ORACLE 10g as backend.

(ii) **Payroll System:** The payroll system is an online, multi user, menu driven system wherein all the functionalities have been covered in great details and is protected from unauthorized access with multi level passwords. It caters for all types of employees like regular, contractual and deputation etc. The system covers Increment processing, DA arrears calculation, Leave without pay (LWP) computation, Monthly Salary processing and generation of bank transfers, Income Tax computation, Foreign Service Contribution etc. The system has a separate Salary module for employees on foreign projects. The system is integrated with Financial Management Information System and PF System. The application facilitates generation of large number of mandatory reports. The application has been developed using ASP 3.0, VB6 and ORACLE 10g as backend.

(iii) **Financial Management Information System (FMIS):** It is an online, multi user, menu driven system. The system provides for all the functions of a financial system like creation of payment, receipt and adjustment vouchers to generation of balance sheet and profit and loss statement for the company. The system has integrated modules for bank reconciliation and fixed asset register. It also provides for calculation of asset depreciation based on policy defined for different category of assets. The system also generates, large number of specially designed reports and MIS reports in addition to standard financial reports. The system is protected from unauthorized access with multi level passwords. The application has been developed using VB6 as front end and ORACLE 10g as backend.

(iv) **PF System:** The online, multi user, menu driven system provident fund system enables the user to process the contributions made during the year and generate the PF ledger. It captures the opening balances, PF contribution details, PF transfer in and loan details (refundable and non- refundable). The module calculates the interest on the PF contribution made. The application has been developed using ASP 3.0, VB6 as front end and ORACLE 10g as backend. The system is fully integrated with PF accounting system and FMIS.

(v) **PF Accounting System:** The online, multi user, menu driven system provides for all the functions of a financial system like creation of payment, receipt and adjustment vouchers to generation of balance sheet and profit and loss statement. The system also provides facility for investment tracking. The application has been developed using VB6 as front end and ORACLE 10g as backend.

(vi) **Inspection Monitoring & Billing System:** It is an online multi-user web-based system developed in a three-tier architecture using .NET with Oracle 10g as backend. The system has inbuilt functionality to allow the access to the various class of users according to their access rights. The system manages master information of all clients for whom the Inspection is carried out. It maintains information about the purchase order raised by the clients and subsequent calls for inspection made against these purchase orders for various items & material listed in them. Against each inspection call the system records the details of inspection, quantity of item(s) inspected /rejected, the time taken for inspection etc and a bill is raised based on the rates as agreed upon with the client. The system has auto email generation facility to clients when a call is marked to the engineer. Vendor wise call details and Inspection engineers assigned against each call is posted on the net. The system captures the details of receipts from the client against the bills raised to them or advance receipts from them. Payments received are posted against the bills. The system generates large number of reports for monitoring the various processes of the system. The system generates general purpose and MIS reports to caters to the need of lower, middle and upper management as well as the clients. It has inbuilt inter unit information sharing facilities to monitor the information of different units of inspection. Exception and Outstanding reports can be generated as and when desired. The system has provision to generate receipt transactions in FMIS format for onward data transfer to FMIS.

(vii) **Knowledge Management System:** The system is an online web-based multiuser system developed using ASP .Net and Oracle 10g. The system manages RITES knowledge database supporting creation, capture, storage and dissemination of information. It has the facility to store information related to RITES as a whole, sectors and sub sectors in which RITES operates, division profile, Employee's professional data, Projects undertaken by RITES, project reports submitted by RITES, software purchased by RITES and details of contractors. The system also facilitates the employees of RITES to upload their CV's and uploading of document submitted by contractors during tender submission. Various search reports are available in the system which assists the user to locate information about employees, project, etc and generate report in World Bank format. The system has been integrated with the Personnel Management Information System of RITES to provide data regarding the employee.

(viii) **Rites website and internet system:** RITES website www.rites.com is hosted by third party agency. The updation of the website is done by the authorized RITES personnel. The website gives information regarding

- Tenders/corrigendum/minutes of pre bid / status of tenders.
- Profiles of various SBU's and details of projects
- Periodic financial results
- ISO manuals and procedures

- Contract Payment
- Settlement status
- Recruitment notices/status/results
- Circulars of RITES

(ix) **Security and Access control system:** The access control system maintains the details of the entry and exit of employees in RITES complex at Gurgaon. The system uses the Microsoft Access database and generates various reports i.e Daily Report of employee's entry and exit; list of late comers and early goers, list of consistent late comers, etc.

Appendix-III List of Office Locations of RITES

Sl. No.	OFFICE	LOCATION
1.	RITES Corporate Office	Gurgaon
2.	RITES Office II- Gurgaon	Gurgaon
3.	RITES Registered Office	Delhi
4.	Regional Project Office	Mumbai
5.	Regional Project Office	Kolkata
6.	Regional Project Office	Bangalore
7.	Regional Project Office	Chennai
8.	Regional Project Office	Nagpur
9.	Regional Project Office	Lucknow
10.	Regional Project Office	Bhubaneswar
11.	Regional Project Office	Secunderabad
12.	Regional Inspection Office (Northern)	Delhi
13.	Regional Inspection Office (Central))	Bhilai
14.	Regional Inspection Office (Eastern)	Kolkata
15.	Regional Inspection Office (Western)	Mumbai
16.	Regional Inspection Office (Southern)	Chennai

Appendix - IV Checklist for the Bidder's proposal

Sl. No.	Documents to be enclosed	Whether enclosed ☑ / ☒
1	Tender fee of Rs. 5000/- (Rs. Five Thousand Only) in the form of Demand Draft/Bankers cheque	
2	Bid Security (EMD) of Rs. 6,00,000/- (Rs. Six lakhs Only) in the form of Demand Draft/Bankers cheque	
3	*Qualification Requirements of the Bidder*	
(i)	Audited Annual Balance Sheets of the Bidder for the last 3 financial years for Sl. no. (i)	
(ii)	Project completion certificate from Client & Other Documentary evidences for Sl. no. (ii)	
(iii)	Copy of SEI CMM Level 5 or higher level certification or Assessment certificate for further regularization or upgradation for Sl. no. (iii)	
(iv)	Certificate by the CEO/ Head of the Company/ External Auditor for Sl. no. (iv)	
(v)	Bid Submission Letter	
4	*Commercial Bid*	
(i)	Power of Attorney in original or duly notarized	
(ii)	Solvency Certificate of the IP	
(iii)	Signed copy of the Tender Document	
(iv)	Un-priced Copy of Price Schedule	
(v)	FORM # 11Litigation History	
5	*Technical Bid as per ITB 8.1.4*	
(i)	FORM # 1 Profile of the Bidder	
(ii)	FORM # 2 Details of Projects Implemented	
(iii)	FORM # 3 Details of the Personnel to Be Deployed	
(iv)	FORM # 4 CV of the Team Members	
(v)	FORM # 10 Confirmation from SAP with regard to their role in SAP implementation at RITES Ltd	
(vi)	Certificate of support from SAP for hardware	

6	*Technical Evaluation Matrix as per Annexure I*	
(i)	Filled up responses for the Technical Evaluation Matrix and Client Certificates, Project completion certificates from clients and other Documentary evidences for the projects mentioned	
7	*Financial Bid as per ITB 8.1.6*	
(i)	FORM # 6 Financial Bid Forwarding Letter	
(ii)	FORM # 7 Price Schedule	

Appendix - V Service level Agreement (SLA)

During the Extended Support Stage of the project, guarantees shall be given by the IP with respect to the operations and availability of the SAP ERP solution.

System response times are dependant upon the hardware and network infrastructure deployed. RITES require specific response times as well as specific availability and reliability from its SAP platform.

Help Desk

During the period of the extended support the IP is required to create and maintain a dedicated centralised Help Desk / hotline that will resolve problems and answer questions that arise from the use of the SAP system as it is implemented at RITES.

RITES expects that this help desk support to users shall be provided on 24 x 7 basis. The details regarding telephonic support will be carefully considered as this will have effect on the support response to RITES system end-users. Bidder response time will be the basis for end-user support response time in RITES's service level objectives with the IP.

RITES expects that the IP will work with the following Service Level Objectives:

Priority	Description	Response Time	Resolution Time	Service Level Objective
Priority 1 (Urgent)	**Severe Business Disruption - Multiple consumers affected:** ➢ Systems Affected: o Application o Servers o Critical processes or applications e.g. ➢ Complete Service Unavailable, no bypass available. ➢ Loss of entire site. ➢ Critical Impact on business. ➢ Viruses threat	30 Minutes	Resolved within 2 Hour	98%
Priority 2 (High)	**Major Business Disruption – Partial Service loss:** ➢ System Affected o Application o Servers o Important Applications	60 Minutes	Resolved within 4 Hours	95%

Priority	Description	Response Time	Resolution Time	Service Level Objective
	e.g. ➢ Critical Components down but bypass available. ➢ High impact on business ➢ System slowdown giving Response Time problems			
Priority 3 (Medium)	**Minor Business Disruption – Medium Impact:** ➢ Systems Affected: o Application o Servers e.g. ➢ Components giving periodic problems but still usable, high nuisance impact to more than one user. ➢ Batch failures that need ➢ Clusters of terminals unusable but alternatives available ➢ Single User impacted with no workaround available	2 Hours	Resolved within 8 Hours	90%
Priority 4 (Low)	**Minor Disruption – Low Impact.** ➢ Any Software Incidents as described within the schedules e.g. ➢ Output mislaid, reprint necessary ➢ Single consumers affected but workaround available ➢ Printer faults ➢ Rectified batch fails within Service Levels	8 Hours	Resolved within 3 Days	90%
Priority 5 (Low)	**Minor Disruption – Low Impact** ➢ Any Software Incidents as	1 day	Resolved within 5 Days	90%

Priority	Description	Response Time	Resolution Time	Service Level Objective
	described within the Schedules e.g. ➢ For information only ➢ Out of scope Incidents associated to problems ➢ Used for queries on applications, etc. ➢ 'How to' queries			

Other key factors to be addressed will be as follows:

- The escalation procedure for handling significant issues.
- The channels for contacting the help desk (telephone, toll-free number, e-mail, etc.).
- Depth and breadth of help desk personnel (as well as 2nd and 3rd level support) knowledge and skills.
- Stability of help desk staffing.
- Quality and responsiveness of help desk personnel (this may be ascertained from client satisfaction survey data from the bidder's existing client base if available or through direct conversations with reference customers).